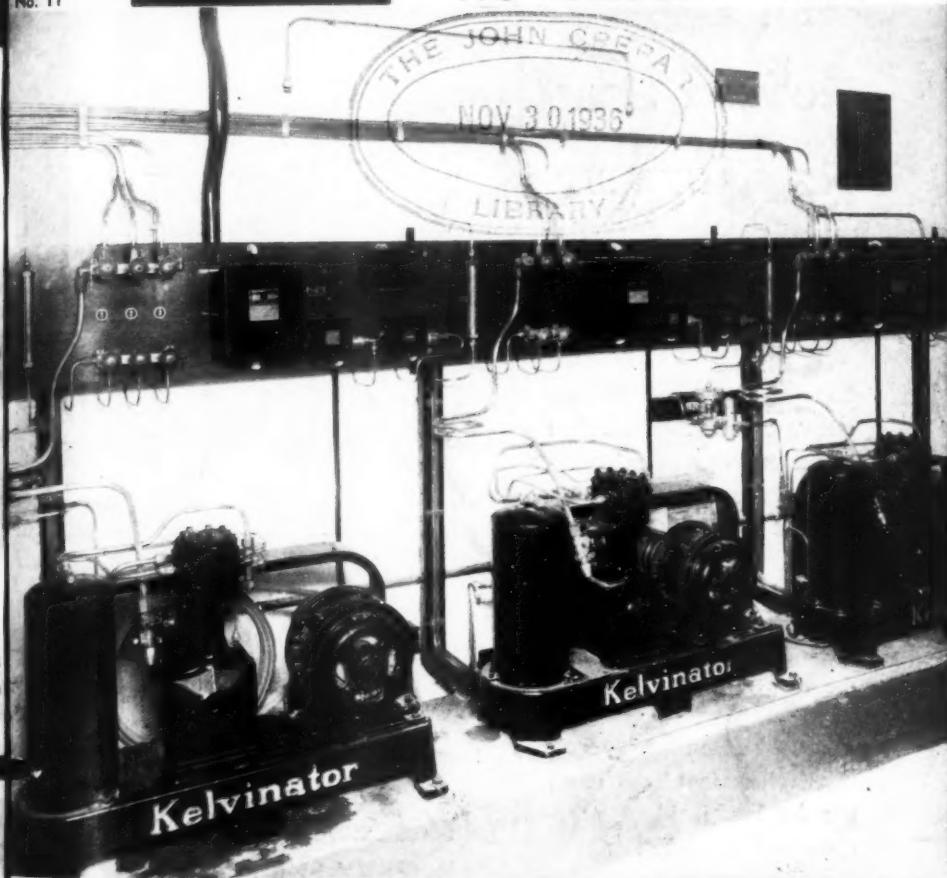


The Refrigeration Service Engineer

Vol. 4
No. 11

NOVEMBER • 1936



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R. S. E. S. Convention Report • The
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Capacities • Questions and Answers

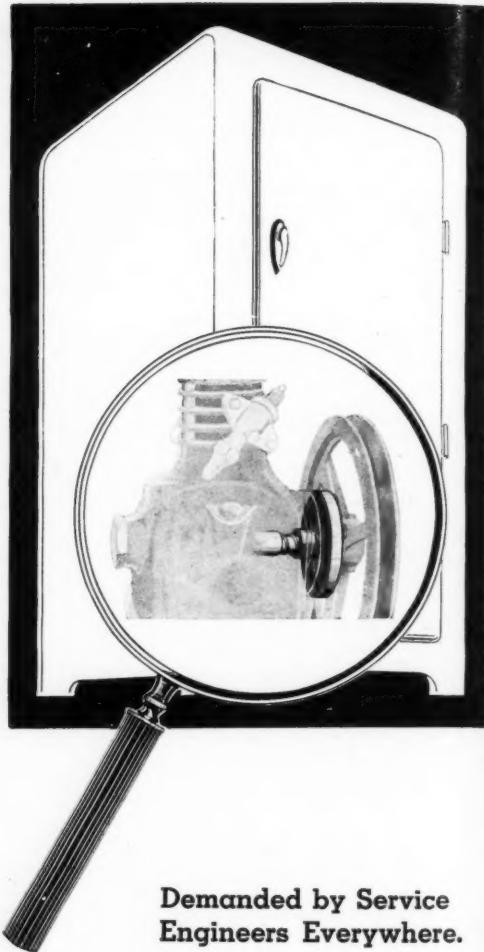
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ROTARY SEAL
REPLACEMENT
UNIT—

That means, for customers, silent, dependable, efficient operation. It means refrigeration at its best. It means **CUSTOMER SATISFACTION!**

For Service Engineers, it means quick, easy installation—a complete job done on the spot—a **REAL PROFIT!**

Your jobber can quickly supply Replacement Units for all popular household compressors. Rotary Seal Replacement Units are fully covered by U. S. and foreign patents.



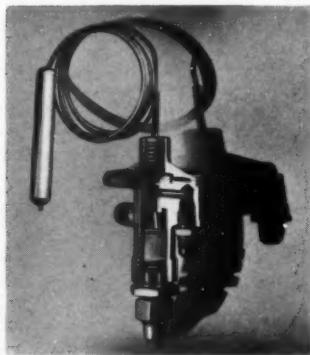
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The tremendous swing toward A-P Thermostatic Expansion Valves is a reflection of their incomparable reliability.

In addition to perfectly-engineered design and high quality of craftsmanship, A-P Thermostatic Expansion Valves have singular features that not only mean more protection, but also the added satisfaction which comes from a dependable service installation.

The body is of forged brass. The leak hazard is eliminated. There can be no trouble from corrosion or fluid obstruction—less cleaning, fewer replacements and lower maintenance cost.

Simple and positive in operation and may be installed in any position or in any temperature, even though higher or lower than the bulb.

Progressive Jobbers Everywhere Stock A-P Controls

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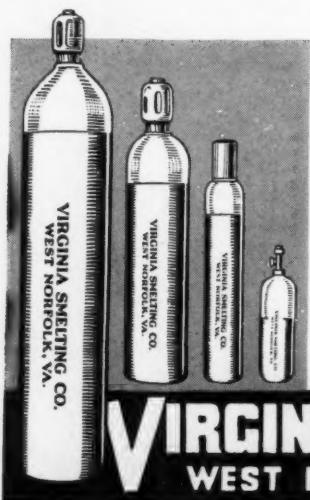


Your problems
• • ARE STUDIED HERE



Our laboratories and technical departments are constantly studying your problems and those of others in an effort to help all who use our refrigerants secure the best results.

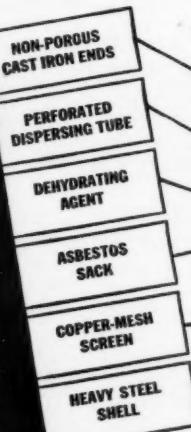
The assistance of these highly trained technical and research departments is available to all users and prospective users of Extra Dry ESOTOO (liquid sulphur dioxide) and V-METH-L (Virginia methyl chloride). For advice and assistance on any problem of refrigeration installation and servicing, write to F. A. Eustis, Sec., 131 State St., Boston.



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...Does not cake,
swell or heat up.
Easy to handle!
Reasonably
priced!



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USE GENUINE FRIGIDAIRE

PRECISION-BUILT PARTS

ANACONDA COPPER REFRIGERATOR TUBES



Coils are wrapped in moisture-resistant paper which protects the finish of the tubes.

Cutaway view of inside of tube. Note the bright inside surface.

Specially deoxidized... thoroughly dehydrated ...unusually soft

There are three outstanding reasons why Anaconda Copper Refrigerator Tubes enable you to do a first-class installation job.

- 1—**Deoxidized.** Anaconda Copper Refrigerator Tubes are *specially deoxidized* to increase their corrosion resistance.
- 2—**Dehydrated.** These high quality tubes are thoroughly dehydrated. They are manufactured according to A. S. T. M. specifications by methods which assure *unusually bright, clean inside surfaces*.
- 3—**Soft.** Then, too, Anaconda Copper Refrigerator Tubes are unusually soft. They may be easily bent and will flare without cracking.

The leading refrigerator manufacturers' specifications for tubes to be used in the installation work are met by Anaconda Copper Refrigerator Tubes. When you install them, you give the purchaser full value. The result is increased good-will for your business.

• • •

Anaconda Copper Refrigerator Tubes are carried in stock by leading distributors of refrigerator parts.



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General Offices: WATERBURY, CONN.

The REFRIGERATION SERVICE ENGINEER

*Devoted to the Servicing of
REFRIGERATION UNITS and OIL BURNERS*

VOL. 4

NOVEMBER, 1936

NO. 11

COVER

THE installation shown on the front cover of this issue was made by Dangar, Gedye & Co., Ltd., Sydney, Australia. Mr. E. Ebeling, service manager, states that this installation was recently completed for the New South Wales Government Railways.

While only three condensing units are shown in the photograph, there is another condensing unit situated on another floor. In all, these condensing units refrigerate the following equipment:

- 11 Food Cabinets ranging in capacity from 10 to 150 cu. ft.
- 5 Salad Pans
- 2 Temprite Instantaneous Water Coolers
- 1 Halsey Taylor Storage Water Cooler
- 2 Ice Cream Cabinets

The units consist of two 2-hp. water-cooled Model WR150 Kelvinator condensing units, one air-cooled 2-hp. Model RB140 condensing unit, and the unit not shown in the photograph—a $\frac{1}{2}$ -hp. condensing unit.

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THAT CANNOT BE OVERLOOKED
"DETROIT"
Thermostatic Expansion Valve • No. 673 •



**GAS
CHARGED
POWER
ELEMENT:**

Provides higher efficiency, instant action with no temperature lag, greater sensitivity, the elimination of overload on the motor in starting. Perfect balance for the system.

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Factory setting eliminates necessity of field adjustment—maintains constant superheat.

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The Refrigeration Service Engineer

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 4, No. 11

CHICAGO, NOVEMBER, 1936

\$2.00 per Annum

Third Annual R. S. E. S. Convention Sets Pace

Manufacturers' Exhibits—Educational Program—Entertainment—
Make Third Convention a Most Successful Meeting. Chicago
Selected for Fourth Annual Convention. Amended Constitution
and By-Laws Adopted With Changes. Ladies Auxiliary Formed.

ARMISTICE DAY—November 11—was an eventful day in the history of the R.S.E.S. Southern hospitality, coupled with delightful weather, greeted the members and guests who came by auto, train and plane to participate in the 3rd Annual Convention, which climaxed the plans of a year of intensive work by Memphis Chapter—the hosts of the 3rd Convention.

The number of hours in the day were all too short to accommodate the activities that were arranged, and every event on the program was carried out with clock-like precision. The members and delegates as they arrived at the official convention hotel—the Gayoso—were greeted with a magnificent manufacturers' exhibit of products, which had been arranged by 41 representative concerns. It was more than merely a display of products, as practically all of the exhibitors had fully appreciated the meaning of the convention, and their displays were arranged so as to show working models of their various equipment and accessories.

Officers elected for the ensuing year were as follows: President, Paul Jacobsen, Chicago, Ill.; First Vice-president, W. H. Moss, Memphis, Tenn.; Second Vice-president, Claude Brunton, Huntington, W. Va.; Treasurer, S. A. Leitner, Kansas City, Mo.; Secretary, H. T. McDermott, Chicago, Ill.; Sergeant-at-Arms, E. A. Plesskott, St. Louis, Mo. Board of Directors: W. W. Farr, Cleveland, Ohio; C. O. McCauley, Pittsburgh, Pa.; Don B. Schuster, Buffalo, N. Y.; A. E. Doan, Toronto, Ontario; C. Buschkopf, Beaver Dam, Wisc. Chairman of National Educational and Examining Board, Geo. H. Clark, Detroit, Mich.

The Board of Directors, meeting on the last day of the convention, selected Chicago as the 1937 convention city.



PAUL JACOBSEN, Chicago
President



W. HALL MOSS, Memphis
First Vice-president



CLAUDE A. BRUNTON
Huntington, W. Va.
Second Vice-president

First Day—Wednesday, November 11

AN innovation of this meeting was that all of the business sessions were held in the afternoon, commencing at 1:30 p. m. Mornings were devoted to the inspection of exhibits. On the first morning, the members and guests were registered from 9:00 a. m. to 1:30 p. m., and also had the opportunity of getting their first preview of the exhibits. Promptly at 1:30, President Geo. Uetz of Memphis Chapter officially called the 3rd Annual Convention to order.

In opening the convention, President Uetz stated that it afforded him much pleasure to officially greet the members and guests, and that he had looked forward to this opportunity as one of the outstanding events in the refrigeration industry.

He then introduced Rev. Israel H. Noe, Rector of St. Mary's Episcopal Church, who pronounced the invocation.

In honor of Armistice Day, the convention opened by singing the Star Spangled Banner.

In introducing Hon. Clifford Davis, Vice-Mayor and Commissioner of Fire and Police, who extended the welcome of Memphis, Pres. Uetz stated that the Commissioner was well-known to Memphians, having been in public life for a number of years, and returned to his office as Vice-Mayor two consecutive terms without opposition, beginning his ninth year in that capacity. Commissioner Davis extended a warm welcome in behalf of the city of Memphis to the convention delegates.



W. W. FARR, Cleveland
Member, Board of Directors



C. O. McCAULEY, Pittsburgh
Member, Board of Directors



A. E. DOAN, Toronto
Member, Board of Directors



S. A. LEITNER, Kansas City
National Treasurer



H. T. McDERMOTT, Chicago
National Secretary



E. A. PLESSKOTT, St. Louis
Sergeant-at-arms

Following Commissioner Davis' address, Mr. Edward F. Barry, who during the World War was in the Aviation Corps and is at present a member of the National Speakers Committee of the American Legion, delivered an address on "Patriotism and Preparedness."

In proceeding with the convention, Pres. Uetz then introduced Mr. James H. Downs, past president of the National Society, who had relinquished his office because of other business affiliations earlier in the year. He then proceeded to introduce the present National Officers.

Pres. Uetz then stated that before introductions were closed, he would like to introduce those members of Memphis Chapter who were responsible for the work which

had contributed so greatly to the success of the Third Annual Convention: Mr. Carl Brakefield of the National Housing Committee; Mr. Bruce Hale and Mr. Geo. Dotson of the Entertainment Committee; Mrs. Marion Uetz, Mrs. Velma Evans and Mrs. Marguerite Bridges of the Ladies' Entertainment Committee. In closing, Pres. Uetz acknowledged his appreciation of the co-operation of National President Paul Jacobsen and Secretary H. T. McDermott, for the cooperation of the National Society in helping Memphis Chapter arrange the many details attendant to the conducting of the Third Annual Convention. He then introduced the officers of Memphis Chapter: Mr. R. L. McCain, 1st vice-president; Mr. Bland Bridges, 2nd vice-president; Mr. Frank Weidlein, sec-



DON B. SCHUSTER, Buffalo
Member, Board of Directors



C. BUSCHKOPF
Beaver Dam, Wis.
Member, Board of Directors



GEORGE H. CLARK, Chairman
National Educational and
Examining Board



THE SPEAKER'S TABLE AND GROUP ATTENDING

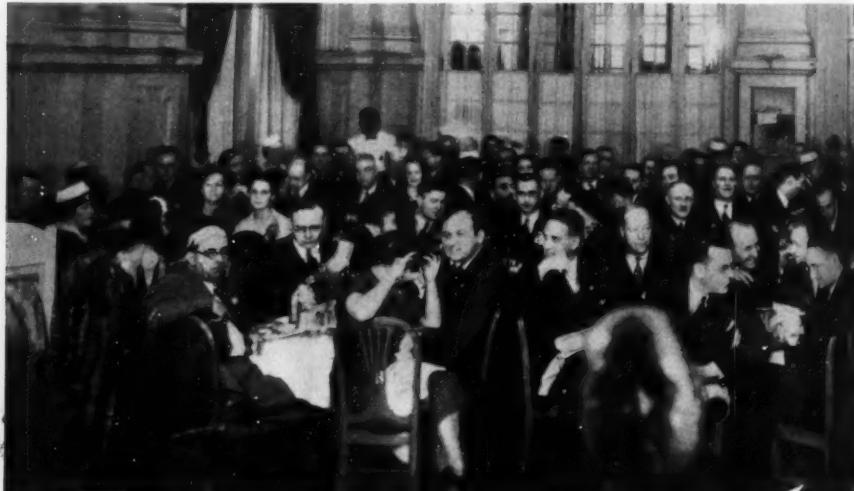
retary and treasurer; Mr. Ed. Hunt, sergeant-at-arms; Mr. W. C. Easley, chairman of the Educational Committee; Mr. John H. Riehlmann, chairman of the Local Publicity Committee; Mr. Boyd Evans, chairman of the Finance Committee, in cooperation with Mr. Jack Brothers, and Mr. W. S. Weidlein;

Mr. W. Hall Moss, chairman of the National Publicity Committee.

President's Address

In assuming the gavel, President Jacobsen addressed the convention as follows:

We are assembled here today for the third time in the history of the Refrigeration Service Engineers' Society and this time in the



ANOTHER SECTION OF THE R.S.E.S. BANQUET



ANNUAL R.S.E.S. BANQUET (ONE SECTION)

beautiful old southern city of Memphis.

The National Organization extends to you a cordial welcome and it is our sincere hope that you will benefit from this convention and also that you will enjoy yourselves.

I am pleased to see the large attendance at this meeting, mostly because it shows the spirit of the organization is spreading farther

and farther as the time goes until we reach our ultimate goal—a nation-wide organization.

In looking back to the beginning of the R.S.E.S. we find a small group of men in six different cities who became interested in an idea—and at the end of 1934 we called a national meeting to see what response we



IN MEMPHIS, NOVEMBER 12, 1936



SEEING MEMPHIS. A GROUP OF CONVENTION ATTENDANTS

PHOTO

would get. No one answered and although we expected a few men to show up nothing was done by the National Society to make what we call a convention. Chicago Chapter was told that they were to supply the meeting place and everything and in spite of the fact that the chapter had no money and they did not know how many visitors to expect and did not have any financial backing from anyone excepting their own members, we had fairly well attended meetings and made quite a few friends among the other members.

It was decided that the 2nd Annual meeting be held in Detroit and that we try to get some manufacturers to exhibit at the convention and also that the National Society pay the bills, and this convention, as most of you know, was a success—six additional chapters had been formed in the meantime and most everybody made a lot of friends—there was a good educational program and a fine exhibit.

Between October, 1935 and today ten more chapters have joined our National Society and there are inquiries from several more cities for information about the forming of chapters. The Society is now financially responsible—with a clean slate—all bills paid and a couple of thousand dollars in the bank.

You will get a complete and detailed report from our Secretary—Mr. McDermott, and the Treasurer, Mr. S. A. Leitner—showing the money that has been taken in and paid out.

You will see that we are now in a position to carry out the things proposed last year in the form of a much more extensive educational program. We are now able to set up a budget for our expenses for 1937 and to give you men some of the things you have been expecting. We have plans which when carried out will repay you men, with interest, the money paid into this Society and you will find that as time goes on you will not be able to get along as well without the help and information which we expect to extend to you.

Looking forward to 1937 as a year of progress for refrigeration men we notice that times are improving; new equipment is being developed which we must familiarize ourselves with. Refrigeration equipment for highway trucks and railroad cars is becoming more and more common and within a short time it will be necessary that we have service stations at certain points throughout the United States where these trucks can pull in for repairs and possibly recharging of their cooling systems. This latter is espe-

TENDANTS



PHOTOGRAPHED IN FRONT OF THE "PINK PALACE"

cially necessary where the trucks carry no machine of their own but are depending on the holdover capacity of the cooling units installed in the trucks.

Air conditioning in homes, stores and buildings is becoming more and more popular and before long it will be almost impossible for merchants to get along without air conditioning, mostly because people prefer to shop at leisure and are being educated daily to shop in comfort rather than to stand and wait in line in hot buildings and stores.

As soon as building gets under way again we will find that most buildings have some kind of air conditioning—some cooled by water systems—but we believe the majority of modern homes will have refrigeration machines which will be cheaper to operate than to pay the high water bills which will be encountered in most communities. The increasing demand in the rural sections of the country—not only in homes, but commercial cooling systems, for stores, farms, dairies, ice cream distributors, and frozen food displays, etc., shows that we must extend our service to points where there was no need for service before. Dairies especially are putting greater demands on the quality of milk as received from the farmers. Up until this

time most farmers have been able to get along with the old spring house and ordinary well water for the cooling of the milk, but it has been found that the farmers can increase their profits by installing refrigeration systems. By keeping milk down to a temperature of 40° rather than the customary 50°, they can keep the bacteria growth down and therefore demand higher prices for their products. You can readily see there are many ways for the refrigeration men to increase their profits in the next few years.

The point is just that we should realize where to make the money and how to make proper contacts. That is why we have this organization. This association can and will be built up to the manufacturers' requirements for service and it is up to us to see that manufacturers have an organization to look to for service on their equipment, whether this equipment be located in New York City, Chicago, or Spokane, Wash., or way down in the southern part of Texas in the Rio Grande valley. We are the men they want and it is up to us to see that we keep up with the times, and that we can give them the service they expect.

I am pleased to report that during the last year there have been quite a number of



inquiries about our members through the Society and that we have been able to aid many members by placing their names before the proper parties. It is possible that these members in some instances have been surprised at inquiries from manufacturers and often they would find that without belonging to the R.S.E.S. they would not have been known as well as they are now.

It is my sincere hope that in the next few years this organization will be known as the link between the manufacturers and the users of refrigeration equipment.

R.S.P.M. Association

The next speaker was Mr. J. D. Colyer of Detroit, Mich., president of the Refrigeration Supplies and Parts Manufacturers' Association, who said that he wished to express his appreciation for the invitation to attend this meeting. Continuing his talk, Mr. Colyer said, "You men are one of the very important links in the chain of one of the greatest potential industries this country has ever seen. You can share the benefits of this industry by knowing all there is to know about production with which you come in contact, about having the right kind of tools, the right kind of merchandise, and doing quality work. We are all interdependent, and more or less depend on somebody else, and we as manufacturers realize we are dependent upon you men for many things, and that without you, we would not be able to do some of these things, and without somebody manufacturing, you men would have to seek and ply your trade elsewhere."

"Whether you know it or not, you contribute tremendously to the comfort of the nation; you are the fellows who act as the fire department and hospitals in all emergencies. Speaking for my group, I want to say that we are eager to get in your hands all the information we have about our products, for after all, you are our customers, and we can only share in your business in relation to the information we make available to you."

N.R.S.J. Association

In behalf of the National Refrigeration Supply Jobbers' Association, Mr. Howell L. Adams of Memphis, Tenn., a member of their Board of Directors, stated, "It is

MANUFACTURERS' EXHIBITS AT CONVENTION

Top—**Feeders Mfg. Co.**, Buffalo, N. Y. **Center**—**R. & H. Chemicals**, Wilmington, Del. **Bottom**—**Airo Supply Co.**, Chicago.

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mighty hard for anyone to make a satisfactory living with his hands and feet. He has got to have a head as well to go along with those hands and feet, and he has got to use that head. At the same time, a man needs those feet and hands for he can't well get around to do those things his head tells him should be done. What I am trying to get over to you is that if you were called in on a job, it should not be your sole function to just repair or install that job without any thought. You should in your mind have a model by which to gauge your work, and not just content yourself by trying to repair the job by use of certain materials that will get it back to working for possibly a short length of time. If you find, after you have gone into it, that the job is an old or obsolete one and that you have a chance to improve it by repairing it, by bringing into play up-to-date materials, then do it. Try to sell the job of reconditioning equipment for that not only makes a nice profit, but gets service work as well, and your customer is better satisfied than he would be with a mere repair job." Further he said, "There is one thing I would like to impress upon you and that one thing is what we each individually own—our reputation. Your reputation is not alone in your own hands, but your reputation is in the hands of your brothers, or your fellow service men. It is in your hands because if for some reason you should see fit to run around criticizing some fellow service man, the person to whom you make this criticism is going to say right away (and rightfully so), 'He can't know it all. Maybe the other fellow is right, and may be a better workman than the one who is doing the talking.' So, what we say against our fellow service man will rebound back at us."

Secretary's Report

Pres. Jacobsen then requested the report of the National Secretary H. T. McDermott:

In presenting his report on the state of the Society, Secretary McDermott outlined the growth of the association, and the progress that could be reported during the period

MORE EXHIBITS AT CONVENTION

Top—Rotary Seal Co., Chicago. Center—L. H. Gilmer Co., Philadelphia. Bottom—Automatic Products Co., Milwaukee, Wisc.





since the first annual convention in Detroit. He stressed the importance of the manufacturers' exposition, which contributed considerably to the success of the meeting from an educational standpoint.

Since the last annual convention, the National Society was in a position to pay all of its past indebtedness and to maintain its expenditures within its receipts. At the last convention, the financial report indicated the balance on hand as of September 30, 1935, as \$905.12, with bills payable after the 2nd Annual Convention, which had been contracted for during preceding years, totaling \$1,080.19. However, as of the convention date, with all bills paid currently to October 31, 1936, the Society reported a balance on hand of \$1,928.15, with accounts receivable of \$46.30. From this amount, the bills for the current expenses of the 3rd Annual Convention would be deducted, which after all deductions, would show a substantial balance on hand to start the active work for 1937.

He pointed out the work of the Educational and Examining Committee, conducted by Mr. George H. Clark, its chairman; the work of the Uniform Cost Accounting Committee, by Mr. Harry Drownes, its chairman; and the Committee on the Adoption of Uniform Symbols, by Mr. Joe Askin, its chairman.

He outlined the increasing activities of the National Society's office, with the increase in membership, and the splendid co-operation which had been secured from all divisions of the refrigeration industry. The report showed that in 1934, six chapters were formed, and in 1935, six additional chapters had been reported. This year, he reported the formation of nine new chapters, consisting of: Cincinnati Chapter; Twin Cities Chapter; Capital City Chapter of Washington, D. C.; Niagara Frontier Chapter of Buffalo, New York; Indianapolis Chapter; Toronto Maple Leaf Chapter of Toronto, Ontario; Central New York Chapter of Syracuse, New York; Binghamton Chapter of Binghamton, New York; and Rockford Chapter of Rockford, Illinois. At

MORE EDUCATIONAL EXHIBITS

Top—Virginia Smelting Co., West Norfolk, Va.
Center—Ranco, Columbus, Ohio. **Below**—Frigidaire Corp., Dayton, Ohio.

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Treasurer's Report

Treasurer S. A. Leitner of Kansas City then submitted the Treasurer's Report, corresponding to the financial report given by the Secretary.

Educational Committee

Mr. Geo. H. Clark, chairman of the National Educational and Examining Board, speaking on the "Progress of Educational Activities and Looking Forward to 1987," prefaced his formal statement of the activities of this Committee by pointing out some of the unusual work that is being done today in refrigeration, particularly on air conditioning jobs. He stated, "that things are developing so rapidly and so unexpectedly in air conditioning that often by the time a man makes a blueprint and turns it over for study, and we are ready to use it, something else has developed which makes his blueprint plans all wrong."

Unique Air Conditioning

"Air conditioning in the South is going to prove a veritable gold mine for you fellows down here, and I hope you will not fail to reap the full returns from it. Speaking of gold mines recalls the fact that we have an air-conditioned gold mine in South Africa. The mine is one of the richest in per ton yield that is in operation. The gold-bearing vein is many hundred feet beneath the surface of the earth, and while it is rich in ore, before the installation of air-conditioning equipment, it could not be worked because there was an average temperature of 95° and a humidity of 88, which made it almost impossible for a human to work. The men who did try to work were able to do so



OTHER EXHIBITS

Top—Alco Valve Co., St. Louis, Mo. Center—Henry Valve Co., Chicago, Ill. Below—Standard Refrig. Parts Co., Chicago.

only a few minutes before it was necessary for them to come out. Naturally, such operation was unprofitable.

"Thanks to an air-conditioning installation, the objectionable conditions have been overcome, and one of the interesting problems in this installation was that of removing the water from the air and getting rid of it after removal. In this case, the water had to be pumped to the surface of the earth, and it took a 50-hp. motor to do this work.

"Many of you have read about the new Hershey Chocolate Corp. windowless building, which is air-conditioned, and a very ingenious device in one of the rooms is a recording instrument which shows the temperature on the outside as well as the inside of the room. A dial in the room registers the outside weather, and others register the inside temperature, and from this information, employees can determine how to dress when they are ready to leave, whether to put on their rubbers, their overcoats, raincoats, or even to prepare to put on their red flannels. I feel that this matter of air conditioning is going to get into homes; that is, moderate priced homes, in a very short time, and consequently, is going to create a greater demand for air conditioning men than we here today can foresee.

1937 Plans

"Now, as regards your Educational Committee, its function is to provide our members with whatever technical material we have in order to help you along in your work. We do this through the issuance of bulletins, and we welcome individual questions relating to any problem. We have always tried, and shall continue to try, to give you intelligent answers to your questions. When we get your questions, we turn them over to our research boys, and they get to figuring on them. When the research boys have solved these questions to their satisfaction, we pass the solution on to you, and it is a great thrill to us to get news from our members stating that our recommendations have actually worked out.

We are going to begin work very shortly in preparation for our next bulletin. We will take up some technical side of the problems which many of you are wrestling with in air

conditioning, and I hope it will be filled with some of the things you are interested in; some problems such as heat loads, air cleaning, moisture, heat and cooling systems, humidity, humidification and dehumidification."

Uniform Symbols Committee

Reporting for the Committee on the Adoption of Uniform Symbols, Mr. Joe Askin of Buffalo, its chairman, presented his recommendations as follows:

"To explain the work, I will have to go back to the time in 1935 when Mr. Herkimer, one of the members and one of the founders of this Society, published a paper in which he gave to us the symbols which he used in the school he conducted in New York in 1934.

"The symbols in this group were the ones that Mr. Herkimer proposed which should be adopted by the Society and used so that all service men and draftsmen would become familiar with the different symbols when they sketched any installation, and everyone concerned would know what this was all about. It happened that Mr. Herkimer's symbols were very good, and a goodly number of them were carefully considered by this Committee for adoption.

"The symbols in this group were discussed by the Committee at its meeting last year, and since then, it happens that the National Electrical Manufacturers' Association, which is a group sponsored by the Refrigeration Machine and Air Conditioning Manufacturers' Association, had also approved a set of symbols for use by the Association. This group was also discussed at this annual meeting last year, and since then, it happens that the National Electrical Manufacturers' Association adopted some symbols of Mr. Herkimer's, and in our list, we have designated some on their list and some from Mr. Herkimer's list.

"Under the circumstances, that meant that both groups had to be considered by the Committee before final selection of any symbols which could be used in blueprints or drafting work.

"The charts reproduced also cover several other groups of symbols that the Committee considered. One group happened to be used

(Continued on page 22)

Symbols Proposed for Adoption by R. S. E. S.

By JOE ASKIN, Buffalo

Name	Her-Kimcr	N.E. M.A.	Fed- ders	B.T.I.	A.I. E.E.	R.S.E.S Proposed Symbol
Beverage Cooler (Beer cooler or water cooler)	(B)					(B)
Capillary Tube (Restrictor)				—~—	—~—	
Compressor - Reciprocating (Pump)	○	○	○			○
Compressor - Rotary (Pump)				○	○	
Condenser - Air Cooled	S		S			S
Condenser - Evaporative		▲				▲
Condenser - Water Cooled	S		W			W
Condensing Unit - Air Cooled (Compressor Assembly, High Side)		○○				○○
Condensing Unit - Water Cooled (Compressor Assembly, High Side)		○○				○○
Controller (Circuit Breaker)				~	~	
Cooling Tower		□				□
Cooling Unit, Immersion Type, Dry Expansion (Immersion Coil)			■			■
Cooling Unit, Immersion Type, Flooded (Immersion Coil)		□				□
Counter (Show Case, Case, Display Case)	△					△
Dehydrator (Drier)		—	—	—	—	—
Evaporator, Commercial Dry Expansion (Non-frost Coil)	■	■				■
Evaporator, Commercial Flooded (Cooling Unit, Boiler, Evap- orator)	O	■				O
Evaporator, Domestic Dry Expansion (Cooling Unit, Cooler, Freezer)			□	□		□
Evaporator, Domestic High Side Float (Cooling Unit, Cooler, Freezer, Boiler)		○	○	○		○

SYMBOLS PROPOSED FOR ADOPTION—Continued

Name	Herr-Kimer	N.E.M.A.	Fedders	B.T.I.	A.I.E.E.	R.S.E.S. Proposed Symbol
Evaporator, Domestic Low Side Float Flooded (Cooling Unit, Cooler, Freezer, Boiler, Icer)						
Evaporator, Forced Draft (Unit Cooler, Blower Coil, Con- vector, Pumidraft, Blower Unit)						
Filter (Liquid Filter, Strainer)						
Freezer, Room below 32°F (Walk-In-Cooler, Reach-in Cooler)						
Fuse						
Gage						
Heat Interchanger						
Higher Temperature						
High Pressure Cut-out						
High Side Float (Float Assembly)						
Ice Cream Cabinet (Ice Cream Freezer)						
Ice Cube Maker (Ice Making Unit, Ice Cube Freezer)						
Low Side Float (Float Assembly)						
Motor						
AC DC						
Pipe Coil (Bare Tube Coil, Finless Coil)						
Pressurestat (Pressure Control, Control)						
Pressurestat with high pres- sure cutout (Pressure Control, Control)						
Receiver (Tank)						
Refrigerator, above 32°F (Walk-In-Cooler, Reach-In- Cooler, Storage Room)						
Scale Trap						

SYMBOLS PROPOSED FOR ADOPTION—Continued

Name	Herr-Kimer	N.E.M.A.	Fedders	B.T.I.	A.T.E.E.	R.S.E.S. Proposed Symbol
Strainer (Suction Strainer)						
Switch (Disconnecting Switch)						
Temperature of Liquid Refrigerant	T_L°					T_L°
Temperature of Refrigerator Air	T_A°					T_A°
Temperature of Refrigerant Gas	T_G°					T_G°
Thermostat (Control, Switch, Temperature Switch)						
Thermo Bulb (Bulb, Feeler Bulb, Capillary Bulb)						
Valve, Automatic Expansion						
Valve, Check (GW Control)						
Valve, Compressor Suction Pressure, Limiting Type						
Valve, Constant Pressure						
Valve, Hand, Back Pressure Regulating						
Valve, Hand, Expansion						
Valve, Hand Shut Off						
Valve - Service						
Valve - Snap Action (Snap Action Two Temperature, Pressure Regulating)						
Valve, Solenoid (Magnetic, Magnetic Stop)						
Valve, Thermostatic (Thermal, Thermo)						
Valve, Temperature Regulating (T.R.V. Valve)						
Valve , Water						



YOUNGSTOWN CHAPTER REPORTED WITH THIS DELEGATION

Front—Justine Eich, Ed Wright, Mrs. Roy Keith, Mrs. Chas. Eich.
Rear—Mrs. M. Bokesch, Chas. Eich, Roy Keith, Martin Bokesch.

in the service school of Fedders and another group was the Buffalo Technical Institute, which conducted an independent study, still another group adopted the symbols now used by the American Institute of Electrical Engineers, and later, another group which represented the group of electrical equipment such as those who control motors. Now, from all of these various groups and their selections, we did not want to select symbols that would be in direct conflict with the American Institute of Electrical Engineers, so they were given first preference, the National Electrical Manufacturers' Association symbols were given second preference, and they gave Mr. Herkimer's selections third preference. The Committee also found that quite a number of symbols were used by the Fedders School and the Buffalo Technical Institute, which were not listed in the other three groups I just mentioned, so we find in with the symbols used by these three groups, others which are used by the schools, and we now have a group of sixty symbols. This does not mean the final word has been said about symbols, for it happens that new refrigerating machinery and equipment is being designed and built right along, and for each such new equipment offered, there will have to be new symbols, so this group of symbols must be flexible, subject to change annually by the Symbols Committee, to include new symbols which shall be designated by the Committee to cover new equipment, which

has been placed on the market since the last meeting.

"If you will look in the last column of the charts, you will see the symbols recommended or proposed for the Refrigeration Service Engineers' Society. I believe after you have gone over these proposed symbols, you will agree that the Committee has tried to make the symbols correspond as closely as possible to what the object looked like as they could. In other words, the Committee tried to make it easy for the men to learn these symbols, and once looked at it would be easy to remember it."

Uniform Cost Accounting Committee

The report of the Committee on Uniform Cost Accounting Systems was presented by Mr. Harry Drownes of Chicago, chairman, whose report follows:

UNIFORM COST ACCOUNTING

JUST one year ago, a concerted action was taken for the adoption of standardized forms for the purpose of arriving at costs. It was conceded that a uniform procedure along this line would eventually furnish comparative data to arrive at standardized charges for service and at standardized mark-up percentages on material sold.

At this time the committee has recommended to the officers of the Society a standardized service form for work done, and a standardized receipt form for money collected. It is anticipated that a majority of the members will adopt these forms during the ensuing year. The resultant use of these

forms will give each user a comprehensive idea of costs, and the eventual comparison of these costs will give rise to other standardized procedures.

It is not the purpose of this discussion to repeat any representations in favor of the adoption of some system to maintain costs. In previous discussions the members of the Society have accepted in principle the advisability of maintaining these costs. The only repetition to be made here covers the suggestion that we are not interested in a cost system which is so involved as to require the services of an expert accountant.

We are presenting a service form, which by no means can be construed as a *cost system*. This form is merely a device to accumulate costs on each service transaction. After the costs have been indicated on each service form, the problem resolves itself into a recapitulation of these costs on any sheet of paper.

The following remarks will briefly describe the service form illustrated:

(A) **THE NUMBERING SYSTEM:** The service forms must be numbered numerically in sequence where the word *work order* appears. Every number must be accounted for either as a charge, call-back or estimate. Under *invoice billing* the invoice number must appear after the service has been billed.

This part of the system is identically the same as any mercantile system engaged in both a charge and C.O.D. business. A separate control sheet should be maintained, showing the work order numbers in numeri-

cal order. A column should be provided alongside of these numbers, in which the invoice number is entered after the billing. Any vacant spaces in this column would indicate either an incomplete job or a lost ticket.

(B) **CLIENT'S NAME AND LOCATION OF WORK TO BE DONE:** This part of the form is self-explanatory and needs no further explanation.

(C) **THE COMPLAINT OR SERVICE REQUEST:** The service form makes provision for the original complaint as registered; also makes provision for the actual existing complaint as found by the service man. It also makes provision for a detailed report by the service man showing how the complaint was adjusted, and finally makes provision for indicated changes or repairs recommended by service man, but not authorized by client. The last provision reflects itself in the final billing or receipt for money received, in which the work done is qualified to eliminate the possibility of a call-back.

(D) **MATERIAL AND LABOR:** Again the form is self-explanatory in providing sufficient space for material used, defective material returned from job and labor. The *shop work* space covers, as implied, any parts removed to the shop for repairs. These items are all billed on this sheet, and from this sheet are copied to a regular invoice, unless an operator chooses to give the client a copy of the service form, in which case service forms must be made out in duplicate, a prac-



MEMBERS OF CHICAGO CHAPTER AT R.S.E.S. CONVENTION



ONTARIO MAPLE LEAF CHAPTER REPRESENTATIVES AT CONVENTION

J. R. Potts G. Burns H. F. Nye A. E. Doan
F. A. Dawson of London, Ont., was also in attendance

tice which we believe should be discouraged. In the case of C.O.D. jobs, we recommend instead a receipt form which shows briefly the amount collected and the work done.

The foregoing remarks cover, in general, the outstanding features of this service form, which features are practically the same as the information embodied on the ordinary type of service forms now in use. The following remarks cover the *cost record* feature of this service form.

(E) *COST RECORD*: The different types of possible service are listed. *General Service* covers the usual service repair business. *Installation* covers the labor and material installing a new job. *Contract* covers the labor, material and shop work on maintenance contracts, where the operator in consideration of a fixed annual sum agrees to keep the equipment in good condition. *Material* covers the sale of parts, refrigerators, etc., where no installation is required. *Call-Back* represents the additional service to be rendered on jobs previously performed on which the operator receives no additional compensation. *Estimates, etc.*, covers the labor or material expense in making free estimates, courtesy jobs, etc. Alongside each one of these headings, we find a space for Labor, Material and Shop. It will be noted that these three headings coincide with the same headings in which the service man reports his material, labor and shop work.

It is very evident that any operator who does his own buying and engages his own labor is now able to translate the billing prices into his cost prices, and these costs must be entered into the spaces provided.

Now to determine the cost for any given period—say one month:

First: Assemble all *General Service* tickets.

List the revenue (which is the total billing).

Then list the Labor, Material and Shop Cost from the Cost Record.

We then have the following:

TOTAL GENERAL SERVICE REVENUE \$
TOTAL COST OF GENERAL SERVICE \$
GROSS PROFIT ON GENERAL SERVICE \$

Second: Do the same with Installations.
Third: Do the same with Material Sales.
Fourth: Do the same with Contract sheets. These calculations will now give the gross profit on these four forms of revenue.

We now come to the Call-Back sheets and the Estimate Sheets.

As will be readily seen, these sheets by their very nature have no revenue. We therefore compile the costs only, and these costs then represent the cost of call-backs and estimates, etc.

Our final set-up then looks like this:

TOTAL GENERAL SERVICE REVENUE \$	
TOTAL INSTALLATION REVENUE \$	
TOTAL MATERIAL SALES REVENUE \$	
TOTAL CONTRACT REVENUE \$	
TOTAL REVENUE ALL SOURCES \$	
COST OF GENERAL SERVICE \$	
COST OF INSTALLATIONS \$	
COST OF MATERIAL SALES \$	
COST OF CONTRACT SERVICE \$	
Deduct COST OF CALL BACKS \$	
COST OF ESTIMATES \$	
GROSS PROFIT BEFORE REDUCING OVERHEAD \$	

If a cost accountant were to check up on this kind of a system, he would repudiate it for the very reason that these figures thus compiled would not tie-up with figures in a general ledger. But the Committee fully appreciates the fact that the average service operator cannot engage an accountant for this work. Suffice it to say that a compilation of costs, such as outlined here, can for all practical purposes be made almost perfect by a man who runs his own business, and who certainly knows his costs at the time a transaction occurs. Our form merely



SERVICE ORDER

SMITH SERVICE CO.
1900 Bank St. Tel. Garfield 6900
CHICAGO

Date _____ Time Rec'd. _____

TENANT _____

Apt. _____ Phone. _____

Address _____

Authorized _____ Their _____
By. Order No. _____

CHARGE _____

Apt. or Room _____ Phone. _____

Address _____

TERMS		COMPLAINT OR SERVICE REQUEST			COMPRESSOR MAKE, NUMBER and SIZE	

Material Used	Req. No.	Quan- tity	DESCRIPTION			AMOUNT	TOTALS
			Service-Man	Date	From	To	
State "New" or "Rebuilt"							
Material Received							
State "New" or "Defective"							
Labor	Service-Man	Date	From	To	Hours	AMOUNT	
Shop Work							

Call-Back on No.	Previous Serviceman Name	TOTAL INVOICE BILLING \$			
Assigned to Name	This is to certify that above labor and material charges are correct.				
Time	Signature _____ Owner, Agent or Tenant				

DROWNE'S SERVICE FORMS—FORM I. Copy, 1936 Refrigeration Service Engineers' Society, Chicago.

FIG. 1. SERVICE ORDER FORM PREPARED BY R.S.E.S. ACCOUNTING COMMITTEE

DETAILED WORK SHEET

State briefly "Actual Existing Complaint" and mention if different from original complaint:

OPERATION	FOUND	LEFT
Head Pressure		
Suction Pressure		
Switch Cut In		
Switch Cut Out		
Cold Control Cut In		
Cold Control Cut Out		
On Cycle		
Off Cycle		
Box Temp.		
Ice Comp. Temp.		

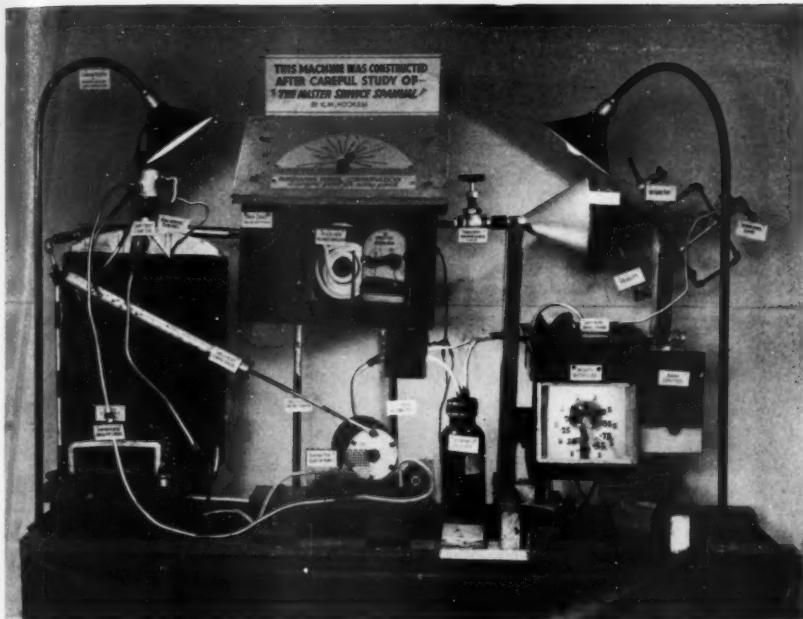
WORK DONE

Was Job O. K. when finished?

If not give reason:-

Signature of Service Man.

FIG. 2. REVERSE SIDE OF R.S.E.S. SERVICE FORM



"THE SERVICE MAN'S DREAM"—By Ansul, Exhibit at R.S.E.S. Convention

sets up this information in such a way that an operator can easily accumulate his figures, and know from month to month whether he is going into the red.

Now we are ready for the question: How does this form help standardization?

The answer is simple. When a man knows his total business and his total cost of doing business, he then also knows his gross profit.

If ten operators in one community get together, they will then be able to give their percentage of gross profit to gross business.

From the experience of this Committee, we can say, without any fear of contradiction, that these ten men would show percentages ranging from 15% to 50% gross profit. Such a condition is unfair competition among ourselves, and knowing the facts we can then get together and further analyze our figures. For instance, we would find in the mark-up of material sold on a job, a percentage which would vary from 10% to 150%, or again we might find a mark-up on labor from 25% to 100%.

Standardization is nothing else but charging one price, and competition would then resolve itself into better craftsmanship or faster service or more advertising or expansion through engaging salesmen, but un-

der no condition can we ever call price-cutting the ethical type of competition which should prevail in our ranks.

Committee on Uniform Cost Accounting,
Harry Drownes, Chairman.

Convention Committees

Pres. Jacobsen then announced the convention committees as follows:

NOMINATING COMMITTEE

Geo. O'Hara, Buffalo, *Chairman*
W. C. Easley, Memphis
W. L. Drake, Indianapolis
H. L. Green, Kansas City
F. A. McLaughlin, Milwaukee
C. Buschkopf, Beaver Dam, Wisc.

AUDITING COMMITTEE

Harry Drownes, Chicago, *Chairman*
Ed. E. Vadakin, Cleveland
E. F. Miller, Cincinnati

GRIEVANCE COMMITTEE

W. G. Euth, Detroit, *Chairman*
V. C. Waight, Pittsburgh
C. P. Eich, Youngstown

RESOLUTIONS COMMITTEE
Willis Stafford, Chicago, *Chairman*
A. J. Meinke, Madison, Wisc.
A. E. Doan, Weston, Ont., Canada

Changes in Constitution and By-Laws
Adopted

The next order of business was the consideration of the proposed changes in the

National Constitution and By-Laws. The Constitution and By-Laws were taken up section by section, and passed on individually. There were a number of additional changes suggested to the proposed changes and the new revised Constitution and By-Laws as adopted will be printed and distributed to each member.

Second Day—Thursday, November 12th

AT 10:00 A. M. the guests assembled in front of the Gayoso Hotel to board buses for a tour of the city. Members and guests and their ladies took advantage of this opportunity to view the sights of Memphis.

Promptly at 1:30 P. M. the second day's session was called to order and Mr. George H. Clark conducted the Question Box, discussing problems presented from the floor.

A New Era in Refrigeration Controls

The first speaker of the afternoon session was Mr. Dan D. Wile, engineer of the De-

troit Lubricator Company, Detroit, Michigan, whose subject was, "A New Era in Refrigeration Controls." Mr. Wile outlined the work that the manufacturers are accomplishing in their laboratories to perfect the refrigeration accessories that are being used in the field. He described the tests and experiments that the manufacturers are adopting in order that accessories and equipment placed in the hands of the service men be as nearly fool-proof as is humanly possible.

Convention Report Continued on Page 54

Compressor Capacities How to Figure for Various Applications

By RAY F. POLLEY,* Chicago

THE selection of a condensing unit must take the complete installation into consideration. The compressor itself, regardless of its capacity, will not operate efficiently if the low side of the equipment does not balance with the compressor. It is very essential that the low side of the system be of the proper capacity so that it can evaporate refrigerants at the highest possible suction

pressure to enable the condensing unit to operate at its maximum efficiency.

Theoretically, the capacity of a compressor increases at higher evaporating temperatures and pressures, due to the greater density and weight per cubic foot of the gas at the higher pressure. Table "A" has been compiled, using methyl chloride as a very typical example. It shows the effects of the capacity

TABLE A

EVAP. TEMP.	EVAP. PRESS.	R.P.M.	WATTS	DENSITY	THEO. B.T.U.	ACTUAL B.T.U.
0°	4	385	1200	.0198	9,800	6,110
18°	18	385	1400	.02998	18,400	10,000
40°	28	385	1570	.0483	20,000	16,000

* Sales Engineer, Mills Novelty Co.

TABLE B

EVAP. TEMP.	EVAP. PRESS.	R.P.M.	WATTS	DENSITY	THEO. B.T.U.	ACTUAL B.T.U.
0°	4	385	1200	.0198	9,300	6,110
18°	13	340	1200	.0299	12,000	9,100
40°	28	290	1200	.0433	17,000	13,600

and wattage at a constant r.p.m. Table "B" shows how the load on the motor determines the actual refrigerating capacity. At a constant r.p.m., the displacement is constant so that with the constant displacement, the higher the pounds of back pressure, the higher the weight of gas pumped. As a consequence, more liquid can be evaporated.

The refrigeration per pound of methyl chloride is approximately 150 B.t.u. per pound; therefore, the more dense the gas, the heavier the weight per pound, the more weight can be pumped; therefore, the greater the refrigeration effect.

The displacement of a $2\frac{1}{4}$ by 3 two-cylinder compressor is 22.85 cubic inches per revolution or .0188 cubic feet per revolution. .0188 times 385 times 60 is 318 cubic feet of gas pumped per hour. 318 times .0198 is 63 pounds at 0°. 318 times .02998 is equal to 95 pounds at 18° 100% efficiency.

Theoretical Capacity

This 100% efficiency figure is known as the theoretical capacity of a machine or the total amount of gas which might be pumped under ideal conditions. These conditions are never attained because of the conditions involved, superheat of returning gas, and various other items.

It is apparent that if gas is drawn into the cylinder, it does not enter as easily as if it were blown super-charged effect. This results in a higher volumetric efficiency and higher back-pressure. As the question of theoretical capacity is approached, the figures in Table A will show the comparison.

To put a constant load on the motor, the speed must be slowed down, and as a consequence, the capacity must be decreased as shown in Table B.

All manufacturers of condensing units have made actual capacity tests on their equipment, under normal conditions. For example, on the air-cooled models, they have operated them in a room maintained at the various temperatures at which the capacity is given and maintained the low-side pressures to correspond with those given on the capacity table; this has also been done with water-cooled units, the water temperature maintained at a constant temperature to make sure that the capacity of the equipment was as indicated on the capacity table.

When estimating the condensing-unit requirements, it is very necessary to take the

manufacturer's rating and be sure that the room or water temperature is properly estimated, so that a compressor of the proper capacity can be selected. It is impossible for the man in the field himself to determine the exact compressor and capacity, and practically every manufacturer has spent considerable time and money in giving the capacity tables to avail their field representatives to select the proper units. By all means, use the capacity tables as given.

Insulation

Insulation of a refrigerator is one of the fundamental parts of a refrigeration installation. A definite value for the installation must be obtained, and knowing the temperature that is to be maintained in the refrigerated enclosure and the higher temperature to which the refrigerator is to be exposed, it can be definitely determined the difference between the refrigerator temperature and the room temperature; and knowing the rate of heat flow through the installation, it is a very simple matter to determine the heat load on the refrigerator itself. Of course, if more than one refrigerator is to be used in the installation, the total heat load is to be added, which is the load the compressor will have to handle. Manufacturers have given this value in many different rates, some at an hourly B.t.u. rate, others for a 24 hour rate; others have assumed that the compressors should operate 12, 14, or 16 hours out of a 24 hour period. Of course, it's not practical to specify a compressor that will give in operation but 12 hours during the maximum conditions, that are only encountered a very short period of the time.

Then, after the insulation or the heat-leaking value of the equipment is known, the proper coils must be selected. All manufacturers as well as compressor manufacturers have determined by experiments the exact heat-absorbing properties of their coils, and it is a very simple matter to select from the coil manufacturer's catalog the proper coil to use for a particular installation; and, of course, it is desirable, in fact, almost necessary, that a coil be used that will allow the condensing unit to operate on as high a back pressure as possible, as we have explained that the compressor will operate more efficiently having gas with a higher density and a greater weight; therefore, receiving a maximum of efficiency from the equipment.

Air or Water Cooled?

The selection of water-cooled or air-cooled equipment is purely a matter of local conditions. In many cases, it is not desirable to use water-cooled equipment due to the fact that the water has a high mineral content that will affect the condenser and make it very necessary to use air-cooled equipment, in which case it is very necessary that the equipment be installed in a location where it will have free air circulation; and due to the fact that it will operate on higher pressure, especially during the summer months on air-cooled equipment, its capacity, of course, will be somewhat decreased and a larger motor used on the equipment to compensate for this condition.

Water-cooled equipment capacity can be varied greatly by regulating the flow of the water. In many cases, the water is at a very high rate and it is impractical to allow the water to flow through at a high rate and more desirable to operate the equipment on a higher pressure, increasing electrical cost somewhat and restrict the flow of water as much as possible.

Small suction lines are the cause of many service problems. A coil using $\frac{5}{8}$ inch copper tubing should have a $\frac{3}{4}$ inch return line to maintain the increase in volume constant, and the use of a smaller line results in a decided fall-off in efficiency.

Selecting the Proper Mechanical Equipment to Properly Handle a Commercial Installation Details to be Considered

A.—Heat Leaks

1. Maximum room temperature
2. Desired storage temperature
3. Wall construction
 - a. Thickness of insulation
 - b. Condition of insulation
 - c. Workmanship on walls
4. Total square feet of surface
5. Set and condition of doors and windows
6. Use
7. Extraordinary loads due to unusual conditions

B.—Product Load

1. Type of products being refrigerated
2. Temperature of products entering cooler
3. Desired temperature of products for proper preservation
4. Number of lights in refrigerated area
5. Number of motors in refrigerated area
6. Number of workmen in refrigerated area

C.—Figuring the Total Heat Load

1. Heat leaks only
 - a. Temperature difference times square foot of surface times K factor equals total heat load per hour in B.t.u.'s

2. Product load only

- a. Weight times temperature difference times specific heat equals total B.t.u.'s

3. Number of workmen in cooler

- a. Number of men times the heat generated per hour per man times the time in the box equals total B.t.u.'s

4. Total heat load

- a. One plus two plus three equals four

D.—Size of condensing units

1. Total refrigeration load per day
2. Refrigerated temperature or suction pressure
3. The best condensing medium available, air or water
4. Condensing medium temperature
5. Operating time of condensing unit
6. Details of space available for location of condensing unit
7. Ventilation of condensing unit space

E.—Selecting Evaporators

1. Total load per day
2. Desired fixture temperature
3. Refrigerant temperature or suction pressure
4. Operating time of condensing unit
5. Interior dimensions of fixture
6. Details of
7. Space available for evaporators
8. Dimensions of doors through which evaporators will be passed for installation

Values Used in Estimating Heat Leakage, Etc.

	B.T.U. PER FT. ² PER F°
1 inch Cork or Equal.....	K — .28
2 inch " " "	K — .14
3 inch " " "	K — .09
4 inch " " "	K — .07
5 inch " " "	K — .06

GLASS

Single	K. 1.13
Double	K. .45
Triple	K. .281

MOTORS

1/20 HP.....	2.96 $\frac{1}{2}$ Per Hour
1/10 HP.....	4.73 $\frac{1}{2}$ " "
1/6 HP.....	5.68 $\frac{1}{2}$ " "
1/4 HP.....	7.09 $\frac{1}{2}$ " "
1/3 HP.....	18.97 $\frac{1}{2}$ " "
1/2 HP.....	13 $\frac{1}{2}$ " "

LIGHTS

1 Wait	3.42 B.t.u.
25 Watt Light..	$3.42 \times 25 = 85.5$ B.t.u.
B.t.u.'s of heat generated per man per hour, working at different temperatures:	
50-degree room....	.684 B.t.u. per hour

40-degree room.... .807 " " "

20-degree room.... 1.054 " " "

Product Load: 25% of the heat leakage of a wall in cooler will give the average refrigeration required.

The Gauge Test Set

History—Various Types and Uses

By L. K. WRIGHT, Mem. A.S.R.E.

THE gauge test set is probably the most important part of the refrigeration service man's kit for it can be used to diagnose trouble, set expansion valves, readjust pressurestats, indicate overcharge, undercharge or presence of air, as well as providing an easy means of evacuating, charging, adding oil, and pressure testing a system.

History

The history of the gauge test set is somewhat like Topsy—it just "grewed." During 1922 the writer was in charge of an installa-

as well as making the compressor and service valves inaccessible to the service man. Again, others had special valves so located as to be almost useless unless the unit could be removed from the machine pocket.

To overcome the inconvenience incident to servicing such models a gauge test set was designed by the writer, as shown in the accompanying sketch, Fig. 1. This set consisted primarily of three small brass pipe tees and two ordinary stop valves, arranged as indicated. This set made the servicing of small units a much easier matter and re-

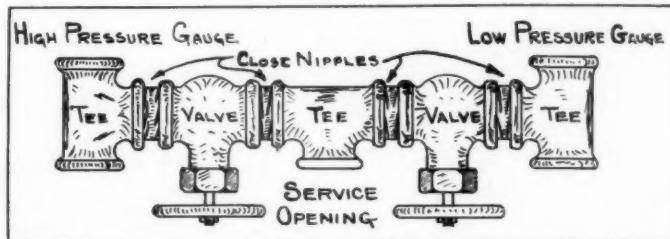


FIG. 1. FIRST GAUGE TEST SET

tion and service department in New York City. Among the units which were brought to his attention for overhauling and service were old "bird-cage" types, with the condensers acting to protect the inadvertent from injury through contact with the flywheel and fan,

sulted in a great saving of time and temper.

About 1930, K. M. Newcum introduced a refinement of the idea, involving the use of special tee valves. Several years later the Kerotest people began the manufacture of their Type 418 Combination Testing Outfit,

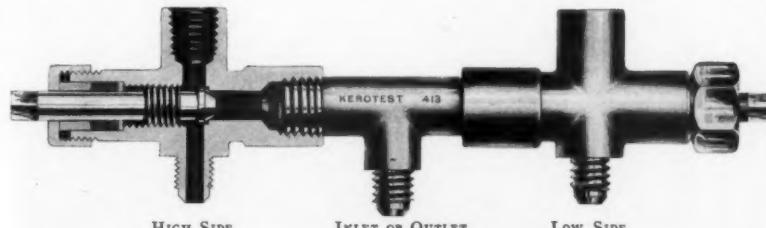


FIG. 2. KEROTEST COMBINATION TESTING OUTFIT

designed along the lines laid out by Newcum.

This apparatus, shown in Fig. 2, had an overall length of $8\frac{3}{8}$ inches and weighed about 1 pound 5 ounces. The stem ends were made to take a $\frac{1}{4}$ inch square valve wrench. Made of forged brass the outfit immediately gained favor. Due to the fact that the service ends were integral with the body wear and reseating of these ends soon caused this type to be discarded.

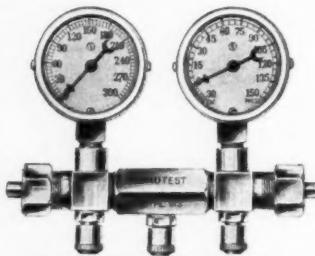


FIG. 3. KEROTEST TEST SET

About 1934 Kerotest introduced a bar type of test set similar to Fig. 3. Later, Type 513 (Fig. 3) was brought out, which is the type on the market today.

The Weatherhead testing set, brought out recently (1935), is cut from a solid section of brass and is provided with hand wheels. Most manufacturers eliminate the handwheels despite the fact that service men acknowledge the convenience of such aids. With the handwheels the Weatherhead set weighs about the same as the wheelless Kerotest outfit. The illustration, Fig. 4, serves to show the similarity between the Kerotest and Weatherhead test sets.

Another test set recently placed on the

market is that manufactured by Mueller. This set follows the lines of Kerotest and Weatherhead sets. Fig. 5 illustrates the Mueller product. It is of drop forged brass and provided with half unions at the service ports, so that they can be removed and replaced when worn. This set is not equipped with handwheels, although the Mueller people make a handwheel ideally suited for this set. The service man who selects Mueller Test Set would be wise indeed to order a pair of their No. A-480 Valve Hand Wheels, with $\frac{1}{4}$ inch square and lock screw. These wheels can be locked on the ends of the valve stems and make for a more convenient test set. The Valve Hand Wheel is shown in Fig. 6. It is light, strong and provided with a milled edge. The lock screw is a very desirable feature. Such handwheels can be adapted to any gauge-testing outfit not already so equipped.

The Imperial testing set, while basically identical with the previously mentioned apparatus, makes use of packless valves and utilizes an offset center leg, as shown in Fig. 7. This set is a recent addition to the Imperial line of refrigeration tools and instruments.

The foregoing testing outfits are practically alike so far as manipulation and use in servicing are concerned. A very recent (1936) addition of test outfit is the Vaneman, produced by the Franklin Machine Products Company, Inc. This Gauge Testing and Charging Connection, as it is termed by the manufacturers, is of forged brass and weighs less than 8 ounces exclusive of the gauges. Fig. 8 illustrates this compact gauge test set.

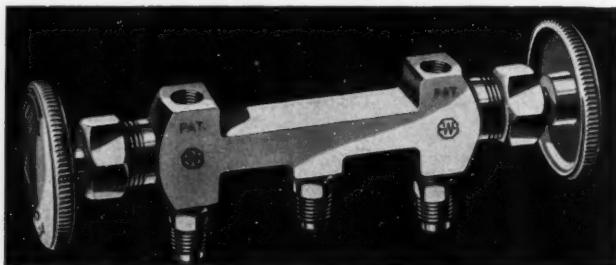


FIG. 4. WEATHERHEAD TEST OUTFIT

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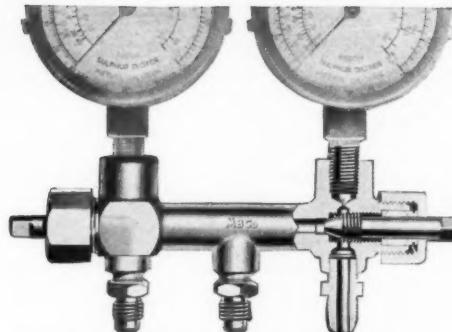


FIG. 5. MUELLER BRASS TESTING SET

Hook-ups for Test Set

In the following diagram (Fig. 9) the various hook-ups for servicing normal or standard household refrigeration systems is illustrated. The data given should be sufficient for the experienced service man. Obviously certain preliminary steps have been omitted and only the main purpose illustrated and noted.



FIG. 6. VALVE HAND WHEEL

About 1928 the writer, finding the then popular Servel high side float system somewhat difficult to service with his old type set, as shown in Fig. 1, redesigned it and produced a light weight three-valve type gauge

test set. This set was of the six port type and provided a means of attachment to the condenser or liquid shut-off valves so that systems could be evacuated without loss of charge. It further permitted testing such

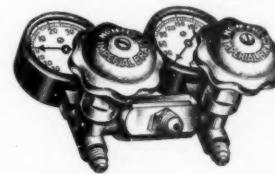


FIG. 7. IMPERIAL TEST SET

systems and resulted in evacuation with a minimum of time. With high side float systems once more coming into favor, this type will probably become popular for such work as well as for uses shown in Fig. 9.

For those who desire to make up their own outfit the data given in Fig. 10 should be referred to. For light weight the body, nuts and wing members should be of cast silicon aluminum. A heavier, but somewhat more durable set, can be made of brass or bronze.

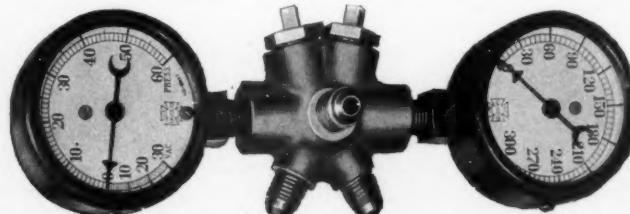


FIG. 8. FRANKLIN GAUGE AND CHARGING CONNECTION

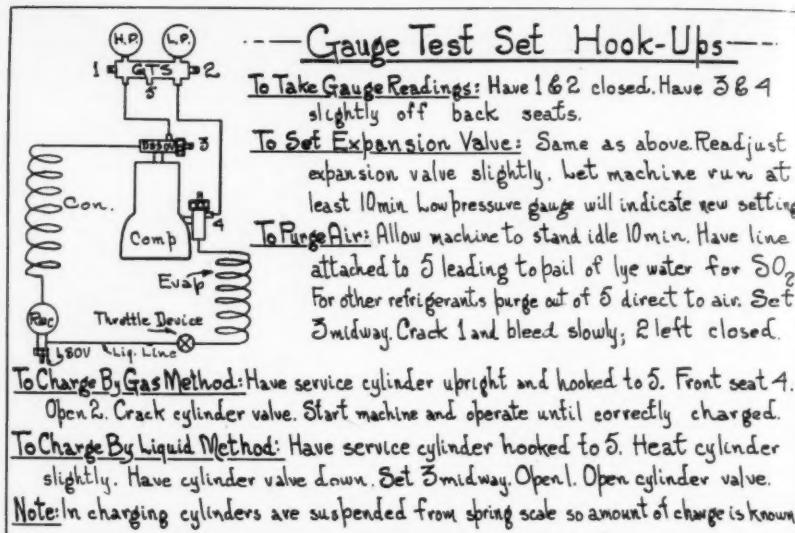


FIG. 9. DIAGRAM OF HOOK-UP FOR TEST SET

The patterns required for the body and the wind nuts are simple and easily made. The parts are so small that no shrinkage need be estimated and the patterns can be made to size. To obtain dimensions from the drawings use calipers on the dimension line given with the sectional assembly view of the set.

This set is somewhat more complicated than the foregoing ones, but to the experienced service man it will be found to be a more convenient device. The two upper ports of the set are for gauges. The three side ports may be plugged or may have half unions, provided with bonnets and nuts. Thus, these openings are available when required. The three bottom ports may be used as shown in the illustration outlining some of the uses of the gauge test set.

The added advantage of the improved set is in the use of the valved center leg and the extra ports. These extra ports find use in servicing high side float equipment.

The Marshalltown Manufacturing Company turn out a Siamese Test Gauge Set which in reality is nothing more than a high and low pressure gauge mounted in a leatheroid container. No valves are included in the design, as may be observed by re-

ferring to Fig. 11, and for this reason the instrument can only be used for ascertaining pressures and is not adaptable for servicing procedures.

Gauges

While no particular reason or advantage has ever been advanced as to the placement of gauges it appears that most engineers and service men mount the high pressure gauge at the left and place the low pressure gauge to the right. This may be observed in the illustrations accompanying this article.

It is advocated, however, that once a gauge test set is assembled that the gauges be kept in the place assigned them, ready to be read at a glance without having to stop and consider whether the particular gauge is indicating high pressure or pressure in the low side.

For low side readings the compound gauge should be readable in increments of one inch and one pound, from 30 inches vacuum to 60 pounds of pressure. This type of gauge is suitable for nearly all the refrigerants encountered in the small unit field.

For the high pressure gauge many use a

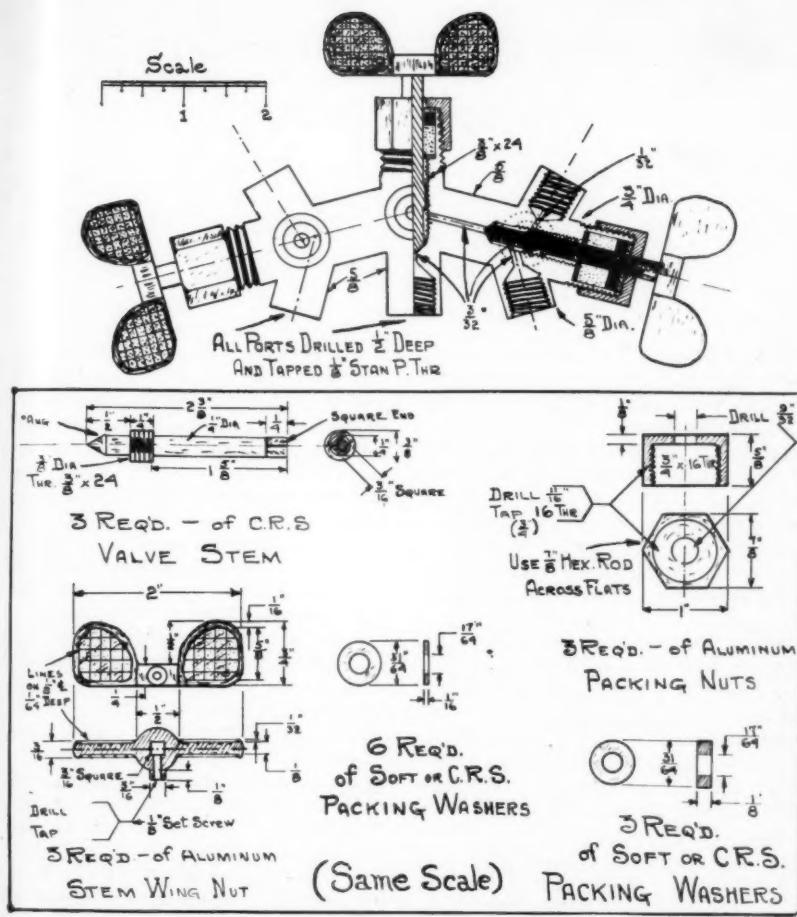


FIG. 10. DIAGRAM OF ASSEMBLED TEST OUTFIT



FIG. 11. MARSHALLTOWN SIAMESE GAUGE SET

is free and really on zero when the gauge is open to the atmosphere and not in use.

pressure gauge but the author prefers a compound gauge for this purpose. The vacuum readings, while not accurate, serve to indicate that the indicator hand

With the pressure type of gauge, involving the use of a stop pin against which the indicator hand rests when at zero, the gauge may be off quite a few pounds and not show it, whereas if one sees the hand pointing to 15 or 20 inches of vacuum when the gauge is open to the atmosphere it would immediately be apparent that the gauge was inaccurate.

A compound gauge reading up to 150 pounds will serve for most household machines. For F-12 jobs a gauge with a higher reading should be selected, such as a 250 or 300 type.

Conversion of Flat Belt Drives to V-Belt Drives

The Advantages of V-Belts. Service Factors.
Flywheel Effect. Design. Other Considerations When Converting to V-Belt Drives.

By R. E. S. GEARE*

CERTAIN definite advantages accrue to the operator of many classes of machinery when V-belt drives, rather than flat belt drives, are employed.

The V-belt drive has a well-defined place in industry and likewise the flat belt drive has its place. Inference cannot be drawn that every drive is satisfactory when operated by V-belts, because this is not the case. The reverse is likewise true—that every drive is not satisfactory when operated with flat belts.

Among the advantages of the V-Belt drive might be listed the following—

1. *Short Centers*—Large ratios between the driving and driven sheave may be secured, due to the gripping action of the V-type of belt. If the center distance practically equals the diameter of the large sheave the arc of contact will usually prove sufficient.

2. *Economy*—V-Belt drives eliminate long center distances usually necessary with flat belts. The result is a conservation of valuable floor space, because large ratio drives can be accommodated within a comparatively small area.

3. *Efficiency*—Efficiencies as high as 98%, with properly designed drives, are secured, demonstrating that the V-Belt drive is so nearly positive in action that loss of power due to slippage is very nearly eliminated.

4. *Cushioned Shocks*—As a V-Belt drive starts in motion and each belt seats itself in the groove, a cushioned effect develops which absorbs the shock of high starting torque, running jerks, and sudden overloads.

This shock-resisting feature, peculiar to the V-Belt drive, is independent of the resiliency in the belt itself. This is not found in flat belting. The general effect is to protect bearings on both driving and driven machinery.

5. *Low Maintenance Cost*—V-Belts are built for matched service under full load tension, so that, once seated and adjusted to usual working conditions, they seldom require further attention. V-Belts require no lubrication, nor any type of belt dressing. They are unaffected by dirt or moisture.

6. *Low Replacement Cost*—Replacement requires renewal only of the belt and not of the sheaves which, being of cast iron or steel, should last a lifetime when used with the proper type of V-Belt.

7. *Noiseless Operation*—A V-Belt is a trapezoidal section of an elastic mass. As it enters a "V" groove the belt bends and the sides bulge, and lock firmly against the sides of the groove. Upon leaving the sheave groove, the belt straightens out—the bulge disappears—and unlocks the belt. The operation is noiseless—yet very efficient. This matter of noiseless operation is a boon in many cases, such as on refrigeration machinery and washing machines where this type of equipment is used in the home. The V-Belt of proper construction has effectively solved the matter of quiet transmission of power.

Different classes of machinery have varying characteristics and what might be the proper drive for one class would be improper for another. The belting, for instance, of a compressor drive might be entirely different from the belting of a fan drive. But the whole thing simmers down to a consideration of—

* Vice president, L. H. Gilmer Co., Philadelphia.

- (a) Characteristics of motor, or prime mover.
- (b) Characteristics of driven machine.
- (c) Use of proper sheaves and belts in the design of the drive itself.

Motors

Many present day motors are built for use with across-the-line starting. This means that the motor quickly accelerates to maximum speed. Usually the driven machine is slower in acceleration due to greater inertia of reciprocal parts and hence a high starting torque develops in the motor. In belting from this motor to the driven machine, it then becomes necessary to have sufficient belts provided so that the area of belts in contact with the motor sheave grooves will act as a sufficient brake to slow down the acceleration of the motor to conform to the acceleration of the driven machine.

Were this not the case, and if there were an insufficient area in contact between the belts and the sides of the grooves, the motor sheave would tend to spin and slip within the belts themselves and burn the belts. It has, therefore, been recommended by authorities that the belt capacity be increased 25% as an arbitrary rule wherever across-the-line motor starters are used. This does not in any way affect the service factor which applies to various machines.

SERVICE FACTORS

MOTOR DRIVEN	FACTOR
Brick and Clay.....	1.2 to 1.8
Coal mining machine.....	1.0 to 1.4
Cotton ginning.....	1.0 to 1.2
Fans and blowers.....	1.2 to 1.4
Flour and feed mills.....	1.2 to 1.3
Laundry machines.....	1.1 to 1.2
Machine tools.....	1.0 to 1.3
Metal mining.....	1.0 to 1.4
Oil field machine.....	1.2 to 1.5
Pulp and paper.....	1.2 to 1.4
Printing machine.....	1.0 to 1.8
PUMPS AND COMPRESSORS	1.2 to 1.8
Rock crushers.....	1.2 to 1.4
Textile (no slip).....	1.2 to 1.5
Woodworking (high speed).....	1.2 to 1.8
Speed-up drive*.....	1.2
Gas engine to compressor*	1.4 to 1.5

* Usually requires special engineering.

In this service factor table unit (1.0) is considered as the standard rating for normal loads. The correction factors are used as multipliers and are not added. On many drives subject to high overloads above normal rating, either in operation or at starting, the following tabulation indicating the preferable increase in belt capacity above the normal or unity rating may be used. Such drives often require motors with special overload features.

PER CENT NORMAL LOAD	MULTIPLY NORMAL LOAD FACTOR BY
100	1.0
125	1.1
150	1.2
175	1.3
200	1.4
225	1.5
250	1.6

When either table is used, across-the-line starting also adds 25% to these ratings of increase.

Different driven machines have different characteristics. They might be listed as follows—

1. A starting load, where the inertia of the whole machine must be overcome with across-the-line starting.
2. Reciprocating equipment, such as compressors, ice machines, pumps, etc.
3. Intermittent loads, such as reversing loads, rock crushers, etc.
4. Continuous heavy-duty loads, such as beater drives in a paper mill where there is possibility of sudden overloads and often a heavy starting under full load.

For these various classifications the service factor table herein reproduced should be taken into consideration in designing the number of belts to be used in the drive.

Flywheel Effect

Especial attention should be given to the matter of the proper design of flywheels. Many old machines do not have enough flywheel weight. It often becomes necessary to redesign the flywheel when changing over to a V-belt drive. At this stage it is possible to refigure the flywheel effect of the driven

sheave and make the proper allowances for the necessary WR2 effect to absorb shocks and vibrations.

Sheaves and Belts

The use of the proper sheaves and belts is very essential. For multiple drives, where symbol belts are used, the following table will give the minimum sheave diameter with the corresponding proper groove angle—

TABLE A

CROSS SECTION	MIN. PITCH DIAMETER OF SHEAVES	BETWEEN OUTSIDE DIA. OF SIDES OF SHEAVES GROOVES	
		3"	38°
A $\frac{1}{2}'' \times 1\frac{1}{32}''$	3"	3.375"	38°
		5.5" and over	38°
B $2\frac{1}{32}'' \times 7\frac{7}{16}''$	5.4"	5.9"	36°
		7.5" and over	38°
C $\frac{7}{8}'' \times 5\frac{5}{8}''$	9"	9.75"	36°
		12" and over	38°
D $1\frac{1}{4}'' \times 3\frac{3}{4}''$	13"	13.875"	36°
		16" and over	38°
E $1\frac{1}{2}'' \times 1''$	21.6"	22.725"	38°

For single belt drives, which rarely use a larger section than the "C" section, there is published herewith a set of curves for both "A," "B" and "C"—and the 2000-3000 and 4000 series Gilmer Fractional Horsepower belts showing the "V" Groove angles for dif-

ferent outside diameters for 38° belts. This table should be used only in cases where single belts are employed and where the diameter of the driving or driven sheave is of necessity below the minimum sheave diameters given in the preceding table—

Try to maintain sheave diameters at the above or minimum diameter as shown in Table "A" for best results. The use of diameters near the bottom of the curves shown in Table "B" tend to shorten belt life—due to the fact that they create a very great degree of flex in the belt. The larger the diameters of sheave over which V-belts operate, the longer the life of the belts.

Tensioning

One of the important facts to bear in mind is that V-belts must be tensioned just as carefully as flat belts. It has been a popular fallacy that V-belts, because of their gripping action, can be run slack and do not require any degree of tension. This is incorrect. It is safe to assume that the average commercial V-belt will show best results with a tension ratio between tight-side and slack side, of approximately $3\frac{1}{2}$. Unless the proper tension is maintained in the belts there is bound to be a tendency for slippage and a deterioration of the belts themselves, due to the motor sheave turning faster

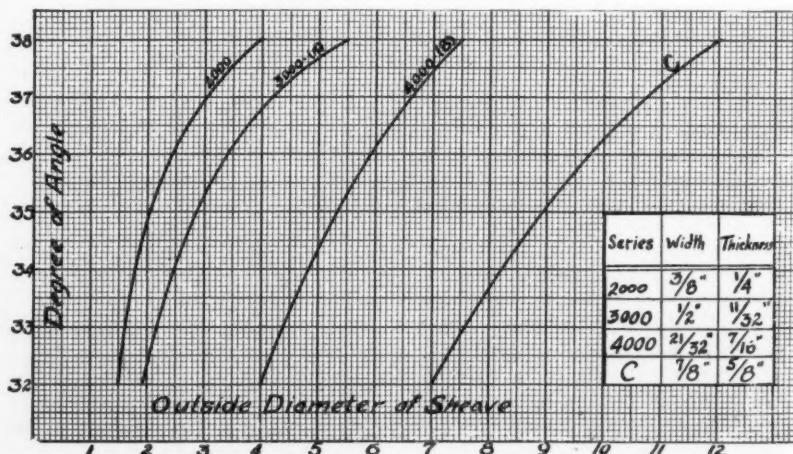


TABLE "B"

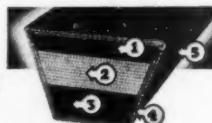
than the belt speed. This will wear the sides of the belts rapidly.

There are several salient points which should be taken into consideration in the design of a drive from the standpoint of sheaves and belts—

1. The sides of the sheave grooves must be smooth. If they are rough there will be rapid wear of the sides of the belts themselves.
2. For conservative design, sheave diameters should be as large as possible.
3. The bottom side of the drive should be the tight side wherever possible.
4. V-belt speeds should never exceed 4500 ft. per minute. About 3000 ft. is a conservative average.
5. The angle grooves of the sheaves should be exactly as specified for the diameter of the sheave.
6. The belts should be tensioned properly, with a tension ratio of approximately $\frac{3}{2}$.
7. A center distance adjustment of at least 10% of the total distance should be allowed to facilitate installation and allow for adjustment.

Belt Design

Various usages of V-belts require different types of belt design. In the symbol, or multiple type of drive, there is a given horsepower rating table used by all manufacturers which calls for a given strength per section of belt. Of necessity, these strengths are high and it has been usual for many belt manufacturers to use the ply type of belt. For the sake of illustration, the cross section of a Gilmer Symbol belt is herewith shown—



CROSS SECTION OF BELT

In this belt the pulling element (2) consists of plies of numerous fine strands of special cord, which insure abundant strength. They permit great pliability in the belt itself. These cords are supported upon a highly heat-resistant, tough, resilient rub-

ber (3) which holds the cords in an exact horizontal plane while the belt operates and gives a firmness to the body of the belt, which prevents whipping. This is the compression section. Above the cords is a section of heat resistant tension rubber (1). Two jackets of bias fabric are essential for best operating results (4, 5). The entire belt has very low stretch characteristics combined with great strength.



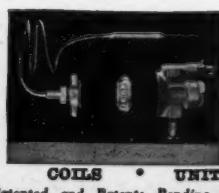
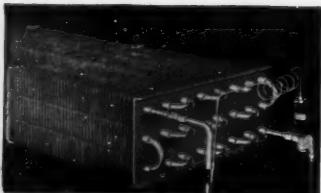
SINGLE STRAND TYPE BELT

In a belt which must flex over an extremely small diameter of sheave the construction of the belt is frequently of the single strand type of belt illustrated herewith.

In this case the thickness of the plies of cords have been supplanted by a thickness of merely one strand of a continuous heavy rubber impregnated cord wound helically around the bottom supporting rubber. The pulling cord, therefore, is endless. Yet, due to the thinness of the pulling element the theoretically perfect "plane of pull" is reproduced. This belt is most pliable and strong over small diameter pulleys—because all of the pulling element is in tension at all times. When the ply type of belt operates over an exceedingly small pulley many of the lower plies of cord are forced into a state of compression and are, therefore, useless from the standpoint of carrying any load. The point may be reached on a sheave of sufficiently small diameter, where with the same given size of belt the single strand type of belt will be stronger *on the sheave* than the ply type of belt, which actually has a much greater breaking strength. It is important, therefore, that the proper selection of the belt for the particular drive should be most carefully considered.

In summing up this paper, and in looking back over failures of V-Belt drives which have come to my attention, I would say that the most prevalent cause has been underbelting, and neglect of proper tensioning of

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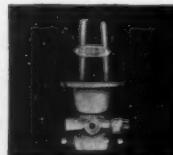
Dallas, 209 S. Pearl St.
Los Angeles, 1501 W. Eighth St.
Philadelphia, 2100 Arch St.



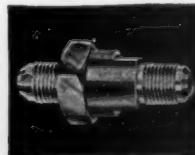
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CONDENSERS



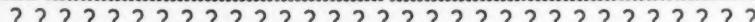
DRAIN BAFFLES



belts. This may have been due to improper designing of the drive where due consideration was not given the matter of accelerations of motor or driven machinery, or it may have been due to some other cause. Sometimes, perhaps, strenuous competition may dictate under-belting because first price seems essential to secure an order. However,

whatever the cause which might have dictated a poor design in the first place, it is a proven fact that the drive will always give trouble—will always wear out belts and will always be the source of worry.

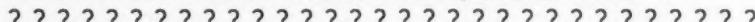
For those who require a short center, efficient drive, the V-belt installation, properly designed, will prove a profitable investment.



The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating

equipment as well as oil burners to "The Question Box." The following questions are answered by Mr. George H. Clark.



CORRECT CYCLE

QUESTION 160. I am residing in a 25-cycle area, whereas most of my radio, wash machines and refrigeration service comes from Buffalo—a 60-cycle area. Trying to service these machines and not equipped with correct cycle causes me a great inconvenience.

Would appreciate it if you can advise me how I can build some sort of a generator which will give me a 60-cycle output. If this is impossible probably you could advise where I could get a generator, reasonable, to cover my needs.

I have a 25-cycle General Electric refrigerator. Would like to change it into a 60-cycle. Kindly advise what changes are necessary to convert same.

ANSWER: In order to get a 60 cycle frequency for test purposes where you are in a 25-cycle district, it will be necessary for you to put in a frequency changer, or in other words a motor generator set. In order to change from 25 cycle to 60 cycle, it will be necessary to connect a 25 cycle motor through some sort of speed increasing device to a 60 cycle generator. The 25 cycle motor will probably be a two pole motor and would turn, if an induction motor, at a speed of approximately 1425 to 1450 r.p.m. when loaded. This should be belted up to turn a four pole generator at a speed of 1800 r.p.m., the generator being supplied

with a direct current to the rotating part by means of a small auxiliary direct current generator. I do not know where one of these sets could be obtained reasonable. Possibly you could shop around in your territory with best results.

I would say it is inadvisable to attempt to change a 25 cycle General Electric refrigerator into a 60 cycle machine, as it would necessitate opening the unit and replacing the 25 cycle motor with a 60 cycle motor.

SERVEL HERMETIC

QUESTION 161. We have a large size Servel Hermetic unit refrigerator, Model No. S-B-9 with which we have had considerable difficulty and we are sending our problem to you hoping that you can give us some information which will set us straight on this machine, and, if at all possible, along with this information would appreciate as complete service instructions on this type unit as possible for us to get, or an address where we may obtain this information.

The machine has been pulled down and completely overhauled. The pump and solenoid valve and automatic valve within the compressor are apparently in good condition. The trouble seems to arise at the time of charging. The pressure on both sides runs high and will not pull down but very

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slowly and after the pull down pressure continues to drop down into vacuum and at this point any refrigeration that may have started completely disappears. The best we have been able to obtain from machine at any time is a slightly cool evaporator and this only lasts for very short period. The condenser does not warm up as it should if the mach'ne is working okay. The capillary tube has been checked and is apparently open. However, at the time of slight refrigeration in the coil the capillary tube sweats the last three or four turns which might indicate a slightly plugged condition there.

ANSWER: I do not have all the service information on the particular Servel Hermetic unit which you refer to, but I have some knowledge of the smaller size Servel Hermetic units which make use of a capillary tube as a pressure reducing device.

I am not exactly sure about your statement of the solenoid valve. The machine which I am acquainted with does not have any solenoid valve as far as I know, but assuming that the mechanical part of the system is all right, I would say that your trouble is probably due to moisture.

With the system in a warm condition the refrigerant would largely be in the evaporator and, as the machine operates, the suction pressure pulls down and the evaporator starts to cool. When the temperature in the evaporator or in the capillary tube reaches the freezing point, any moisture in the refrigerant might freeze in the capillary tube restricting it or plugging it up almost entirely in which case the refrigerant in the evaporator would be drawn out and no further refrigeration would obtain.

The same trouble might also be caused by having too small a capillary tube or, that is, one with too much restriction. This would allow the refrigerant to get into the evaporator during an off period but would not allow it to enter the evaporator as fast as it is evaporated while the machine is in operation.

This might also be due, of course, to a partial restriction of the capillary tube.

It would also be advisable to check for gas supply and also to be sure that a good

grade of refrigeration oil is used which would not tend to congeal in the tube.

If this information does not help, I would suggest you contact the Service Department of the Servel Company, Evansville, Indiana, to see if they can help you.

WAYNE REFRIGERATOR

QUESTION 162. *I have a Wayne box to repair. I have gone over the compressor with a fine tooth comb—new bearings, turned a groove in piston and fitted good ring, replaced both valves—compressor will pull 30 inches of vacuum and 175 lbs. head pressure. Have cleaned and reseated the expansion valve; have taken out all gas and recharged; have purged again and again to be sure no air is in the system.*

Box will not go under 52°; have tried the vacuum from 10 inches to 0, but no better results. SO₂ charge 1 3/4 lbs. Have tried all way from 1/2 to 2 lbs. and head pressure from 20 to 100, but no better results, as 52 is just as low as I can get it.

Is it possible that the coils can be clogged up? If so, how can they be cleaned?

One other thing: the vacuum gage is rather unstable; may run a long time fairly steady and then suddenly jump to 20 inches and as suddenly go back to 5 or 0.

Can you give me any suggestions as to the best way of getting this box to come down to at least 45?

So far as I can see there is nothing I know of to make it any better.

The name plate reads as follows: Model No. C1, Serial No. C16246—Box No. 3095.

ANSWER: My suggestion with respect to the Wayne refrigerator is to put in about one and one-half or two pounds of sulphur dioxide, which should be a proper charge, as I believe this particular refrigerator has a dry-type evaporator using an automatic expansion valve. I would set the expansion valve to operate at six inches vacuum. With the proper charge of refrigerant, the expansion valve properly set, and the compressor pumping as it should, you should get good refrigeration.

Since you indicate that the cooler itself does not pull down to a low enough temperature, I would suggest that you check the brine tank, which I believe this refrigerator

makes use of, to be sure that the brine has not leaked out of the evaporator. If the brine has leaked out, the surface of the tank, of course, will not be properly cooled even though the coil on the inside of the tank may be cold.

I do not believe the coils will be clogged up if you can adjust the expansion valve to maintain whatever suction pressure you want. The fact that the suction pressure jumps suddenly is probably an indication that liquid refrigerant is getting back into the crankcase of the compressor and, when this is pumped out again, the suction pressure returns back to normal.

Also, check box for air circulation around coil down into cabinet and return.

CLEANING WATER-COOLED CONDENSERS

QUESTION 163. *Would you kindly advise me as to the best method of cleaning lime out of water-cooled condensers?*

ANSWER: I have tried to obtain information as to how to clean lime from water-cooled condensers and have not had very good success. However, I have run up against the same trouble in connection with water-cooled condensers where water passes through a coil of tubing in the refrigerant shell and I have had some success with two methods of cleaning out these tubes. Both of them depend on having the tube not totally plugged.

One method consists in mixing up a strong lye solution and forcing it through the condenser tube by means of compressed air. In one case I was able to clear a tube out in this way, but it seems that rust and sludge was the principal deposit which came out.

In another case I have had a fair degree of success by sacrificing a pound or so of methyl chloride. In this case I simply connected a refrigerant container on to the water tube of the condenser and opened the valve of the refrigerant container, passing the liquid refrigerant directly into the tube. The evaporation of the liquid causes a quick chilling of the tube, which tends to make it contract away from the deposit which has a different rate of contraction with a temperature change. The refrigerant vapor passing through tends to wash out any sludge or scale which has broken loose. This method

has been used in power plant work for cleaning out tubes in various devices. In that case hot steam was passed through the tubes and then the cold water was passed into the tubes and by alternating steam and cold water, the tubes were caused to expand and contract, thereby breaking loose from the scale which is blown out of the tubes.

MAJESTIC HERMETIC

QUESTION 164. *Here is a service problem which I wish to consult you on. We are having quite a lot of trouble servicing Majestic hermetic sealed units, Model 200. We have tried several ways and means of overhauling the units, but we can't make them pump. We have made several tests. We have tested check valves, evaporator, condenser, and find these parts are O.K. We have also tried all the known oils. We feel sure there is some one thing wrong with the unit. We have even set the eccentric over to the last tolerable clearance. If you can give me any information as to my troubles, I will assuredly appreciate it. If I have not given enough information, please advise me and I shall rewrite this.*

ANSWER: I do not know that I can give you any information on your particular problem. If the clearances are as small as they should be and the compressor has oil and the check valves are working properly, the machine really has to work. If it doesn't, it must be due to one of these things; or perhaps possibly due to a sticking vane. If the compressor is badly worn so that the clearances are too great, it may be pretty difficult to make it work properly.

CORRECT AMOUNT OF REFRIGERANT

QUESTION 165. *I would like you to tell me, or tell me where to find, the following:*

The correct amount of refrigerant to add to a domestic or a commercial system already in operation, and the presence of too much oil in the evaporator.

ANSWER: Your question, while brief, is a big one, and very difficult to answer. The correct amount of refrigerant to add to a domestic or commercial system already in operation is simply enough refrigerant to make the system function properly.

In any system which makes use of any pressure reducing devices other than high

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side float valves or capillary tubes, the system should contain enough refrigerant so as to maintain a reserve in the liquid receiver sufficient to cover the tube which is the outlet to the liquid line. In a capillary tube or high side float valve system, the correct amount of refrigerant is that amount which will cause the whole evaporator to refrigerate but will not cause a frost back. Both of these systems are very critical in refrigerant charge. In one instance I charged a refrigerating system with $1\frac{3}{4}$ ounces of methyl chloride; 2 ounces of methyl chloride would cause a frost back; and only $1\frac{1}{2}$ ounces would not put the whole evaporator in service. The condensing unit was a 1/6th hp. machine having a capacity of approximately 100 pounds i.m.e.

There is little need of worrying about the amount of oil in a dry type evaporator. In a low side float type of evaporator we have an oil bound condition when the evaporator

contains such a large quantity of oil and such a small amount of refrigerant that we get poor refrigeration. Generally this will show up in that the freezing time for ice cubes will be very great or that possibly ice cubes may not freeze at all. In a more pronounced case the header of the evaporator may be the only part which actually gets cold, while the tubes which remove heat from the ice trays do not frost at all; and in a still more pronounced case, I have seen evaporators so full of oil that the float valve did not open and let any refrigerant into the evaporator at all. The evaporator was really completely full of oil. In addition to the oil bound condition causing an increase in freezing time, there is a peculiar bubbling noise which sounds like a stream of bubbles passing up through the thin oil in the evaporator while the machine is in operation. This noise is somewhat different than we get with the evaporator in normal operation or when the system is low on refrigerant.

NEW MECHANICAL DEVICES Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer. Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

SYLPHON AUTOMATIC EXPANSION VALVE

IN developing the Sylphon No. 5000 Automatic Expansion Valve, an attempt was made to overcome or minimize the most common difficulties experienced with automatic expansion valves. Investigation among the trade and service men indicated that major troubles, taking frequency and seriousness of complaints into consideration, were as follows:

- (1) Valves inoperative due to accumulation of dirt or moisture from system at the orifice.
- (2) Valves leaking due to corrosion of needle or seat, or both.
- (3) Bellows failure from mechanical causes or corrosion.
- (4) Valves rendered inoperative due to moisture entering valve body through ad-

justment opening and freezing between bellows folds.

It is obvious that valves rendered inoperative due to accumulation of dirt or moisture from system at the orifice is a difficulty beyond the control of the expansion valve manufacturer. The valve body size is a limiting factor in increasing strainer or screen area. A further limiting factor is that large strainners or screens will collapse more easily than small ones, particularly when partially clogged. Taking the above factors into consideration, a maximum of seat protection from clogging was finally secured by employing a highly efficient disc filter unit. This filter unit is the same type widely used for industrial filters and has a larger effective area than a screen or strainer of comparable size. This filter unit will not collapse when partially clogged.

Valve leaking due to corrosion of needle

or seat is a difficulty that obviously cannot be entirely eliminated. The best alloys available will not entirely withstand effects of corrosive agents frequently present in the refrigeration system. After considerable research a valve seating arrangement was finally developed which does not follow the conventional seat and needle construction. A non-metallic poppet of inert composition closes against a metallic seat of special alloy. Extremely tight seating is obtained. The poppet, being of inert material, is not attacked by corrosive agents which may be present. If slight corrosion or wear occurs on the seat, the hard alloy will "work" into the less dense composition of the poppet and tight closure is still obtained. Not having dissimilar metals present in seat assembly, there is no possibility of damage from electrolysis.

The possibility of bellows failure is reduced in the design by employing a two-ply Sylphon operating bellows.

It was found advisable to provide a positive seal at the adjustment screw to prevent moisture from entering valve body and freezing between folds of operating bellows. This consideration was particularly important for low temperature application. A Sylphon bellows is used for the purpose and provides a positive seal that will not deteriorate. In event of main bellows failure, the extra sealing bellows also provides insurance against losing refrigerant charge.

In operation and appearance, the valve follows conventional lines. A forged body was selected for strength, durability and appearance.

In addition to laboratory tests, this expansion valve has been thoroughly tested in the field by several manufacturers and refrigeration service organizations.

IDEAL CONCENTRIC COIL WINDING HEAD

A COIL winding head of an entirely new type is being announced, that winds single-phase-motor coils in gangs or groups up to six in a nest in all sizes and shapes, connected in series, so that they can be removed together and inserted in the stator without series soldering.

This marks an advance in the type of winding head used by motor manufacturers and service shops. After winding, the head is collapsed to permit the easy removal of the coils.

Adjustable Head

The new head, which is adjustable for length and width of coil, can be set up for winding in from five to ten minutes.

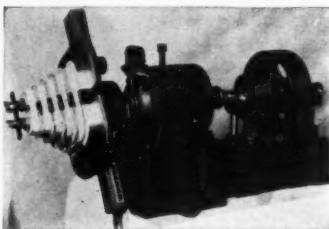


Illustration shows the Ideal Concentric Head mounted on the newly developed Coil Winder Drive, showing group of coils wound in series and tied ready for inserting in motor.

The unit has a base with a scale on the side and a flange for mounting coil winder head onto the drive. On this are mounted two adjustable face plates with adjustable aluminum segments over which the coils are wound. Setting these segments for a given set of coils and clamping them to the face plates is simple and fast work. An indicating mark on the face plate facilitates bringing them back to original position instantly, if desired, after running a set of coils; therefore, it is not necessary to stock a multitude of forms for occasional runs.

Brings Appliance Business to Repair Shops

With this unit, the electrical service man is in a position to service profitably, at a low price, the motors of refrigerators, washers, oil burners, etc. This is volume business and carries with it sales of bearings, bushings, brushes, etc. The whole appliance field, and in fact, the entire field of small single phase coil replacement is opened up to him by this device.

This new Concentric Coil Winding Head has been developed by Ideal Commutator Dresser Co., 1098 Park Avenue, Sycamore, Illinois, who will gladly furnish additional information upon request.

MINNEAPOLIS-HONEYWELL ADVERTISES TO CONSUMERS

COINING the new expression, "Inside Weather," Minneapolis-Honeywell Regulator Company devotes its entire fall advertising campaign to the sale of Automatic Heating and Air Conditioning equipment on behalf of such manufacturers, distributors, and dealers. "We fully realize that our success and the success of the Automatic Heating and Air Conditioning industry is inseparable," George B. Benton, Advertising Director said, "and we have therefore devoted our campaign to furthering the interests of this industry."

National magazines, such as the Saturday Evening Post, Time, Collier's, American Home, House Beautiful, House and Garden, Business Week, Nation's Business, and the New Yorker are being used in addition to leading newspapers from coast to coast, delivering a total of more than 76,000,000 separate messages on behalf of the automatic heating and air conditioning industry, urging the installation of such equipment.

Typical headlines in this campaign are: "Let 'Er Blow, It's June Inside"; "Order Your Inside Weather Now"; and "The Inside Weather the Doctor Ordered." All advertisements are signed: "Install Automatic Heating and Air Conditioning—See your Dealer Now."

In addition to broadsides describing the campaign, dealers are supplied with window displays and posters, all urging the installation of Automatic Heating and Air Conditioning.

AUTOMATIC PRODUCTS COMPANY MOVES INTO NEW LOCATION

COME Turkey Day, Automatic Products Company, that lusty automatic control firm in Milwaukee, will be moved to new and larger quarters.

Roy W. Johnson, president, recently purchased the newly built enameling plant formerly owned by the Fuller-Warren Stove Company. This modern, sun-lighted building gives Automatic Products Company something over 60,000 square feet of manufac-

turing space, with plenty of room for further expansion.

"One of the advantages of the new building," says Mr. Earl Valle, sales manager, "is that all production will be on one floor." He looks forward to the new location helping to improve the already unusually prompt service of the firm.



NEW HOME OF AUTOMATIC PRODUCTS

Started during the blackest years of the depression, Automatic Products Company grew by leaps and bounds. A true depression baby is now a lusty youngster and in the face of apparently overwhelming odds. At the outset the company policy was dedicated to the task of building better automatic controls for refrigerating, oil heating, and air conditioning applications. The engineering staff designed them to lick operation problems not tackled by others, and sent them to their customers on the day they wanted them.

How well this policy has succeeded is exemplified, not only by this move to larger space, but by the reputation for dependability that Automatic Controls have amongst the trade.

When you are in Milwaukee, be sure to visit the new A-P factory. It is one of the most modern in the Milwaukee manufacturing area, and is located in the 2400 block on North 32nd St.

NEW LIQUID LINE FILTER

ZENITH Carburetor Company of Detroit, Michigan, has just announced the development of the Zenith refrigerant filter for use in all domestic electric refrigerators using sulphur dioxide, methyl chloride, or "Freon." This type of filter has been successfully used in commercial refrigeration

for the past two years, meeting the filtering needs of these types of refrigerators.

The advantages of the Zenith filter, according to Mr. Benj. F. Heftler, who is in charge of the Filter Division of the Zenith Carburetor Company, are, first and foremost, that its inherent design and new stack type filter elements provide a filtering fineness of 2½ times that of the normal 120-mesh wire screen. This fineness is .002 of an inch, which insures positive filtering of the refrigerant.

The advantage of the filter in the refrigerant line is that it eliminates most of the difficulties encountered in clogging or inefficient operation of the liquid control devices and valves. Removal of dirt and foreign matter insures a greater degree of operating ease by the use of this type filter. It is leakproof, rustproof and corrosion proof, and is practically indestructible. According to the manufacturer, it will outlast the life of the refrigeration unit itself.

It can be quickly removed for easy cleaning, and there are a series of sizes with ample capacity to handle the liquid requirements of any type domestic refrigerator.

A number of jobbers of refrigeration parts are already being appointed as distributing outlets and the use of these filters at the hands of service men is now becoming quite extensive. Inquiries regarding this new type refrigerant filter should be addressed to the Zenith Carburetor Company, Detroit, Michigan.

* * *

GOLDENROD BUYS 300 MILLS COUNTER ICE CREAM FREEZERS

THE Goldenrod Ice Cream Company, one of the largest and best known makers of ice cream in the city of Chicago and the Middle West, has just purchased from Mills Novelty Company, also of Chicago, the largest single order of counter ice cream freezers ever to be placed with any company.

Always on the alert for improvements in the ice cream business, the progressive Goldenrod organization has contracted to place in twenty-five of the Chicago Public Schools, Mills Counter Freezers which will supply the school children with delicious, soft specialties like Big Shake and Frosted Malted, frozen

fresh right in the several school buildings.

Goldenrod has been one of the leaders in this industry in Chicago, having installed the first of the electric ice boxes in retail stores. Since then they have led and fostered many of the advancements and improvements brought about by the big ice cream companies.

When they recognized the value of the counter ice cream freezer in the ice cream world, Goldenrod immediately went into research on the various makes of freezers on the market. After a most intensive study they decided that the Mills Novelty Company's product was the most satisfactory of all. With no further ado, Mr. L. D. Olin and Mr. David Olin, heads of Goldenrod, arranged with Messrs. Fred L. Mills, Ralph J. Mills and Dennis W. Donahue of Mills for the delivery of the Mills freezers.

The Goldenrod Company manufactures a fine brand of ice cream mix, the unfinished product used in the counter freezer in the freezing of ice cream and various freezer specialties. Their ice cream mix business has shown remarkable gains in recent years.

Mills Novelty Company is the largest manufacturer of counter freezers in the world and besides making their own freezers are the only counter freezer manufacturers who build their own condensing units for their own freezers.

* * *

FULTON SYLPHON FORMS VALVE DIVISION

THE Fulton Sylphon Company, Knoxville, Tennessee, announces the formation of a Refrigeration Valve Division to handle the sale of their new Expansion Valves. Personnel will be composed of R. S. Dawson, manager, at Knoxville; Gorton F. Price, Detroit, Michigan; C. O. Petterson, Cleveland, and D. W. Mason, New York. Sales to the trade will be made only through established refrigeration jobbers.

* * *

F. J. HOOD PROMOTED

F. J. HOOD, formerly attached to the Eastern Division of the Ansul Chemical Company, has been recently promoted to the sales staff of the company's main office at Marinette, Wisconsin.

Mr. Hood, prior to coming to the East, was manager of the Ansul Chemical Company of California located in Modesto, California. Since leaving the West in 1933, he has made his headquarters at the Eastern office of the Ansul Chemical Company in Paoli, Pa.

He will take up his new duties at Marinette, Wisconsin, in the very near future and confine his efforts on general sales promotion for the parent company.

CHRISTIANSEN WITH AUTOMATIC PRODUCTS

MR. R. H. CHRISTIANSEN, formerly with the Underwriters Laboratories as testing engineer, is now connected in sales capacity with the Automatic Products Company of Milwaukee.

Mr. Christiansen's special knowledge of the oil burning appliances, such as space heaters, circulating heaters, hot water heaters, etc., will enable him to help the manufacturers with their problems of automatic control of oil.

IMPERIAL HOST TO CHICAGO SERVICE MEN

FLLOATS, valves, fittings and tools were the subjects discussed at one of the best attended monthly meetings of the Chicago Chapter of Refrigeration Service Engineers' Society held on Oct. 18 at 5247 W. Madison St., Chicago. Approximately 125 were present.

The Imperial Brass Manufacturing Company, Chicago, acted as host to the Society at the meeting and representatives of this company who were introduced by Paul Jacobsen, president of the Society, and who spoke were: W. A. Leonard, vice president, George Franck, special engineer on float valves, and R. D. McIntosh, chief engineer. Harold T. McNeillis, sales representative of the company in the Chicago area, was in charge of arranging the meeting.

Service men have played a highly important part in the advancement of the refrigeration and air conditioning industry, it was pointed out by Mr. Leonard in his introductory remarks. Many of the ideas which have resulted in improved equipment for the in-

dustry are traceable directly to this group, he stated. He particularly emphasized the value of the Refrigeration Service Engineers' Society as a clearing house for ideas.

George Franck in his discussion of float valves took up the high side and low side types, and explained in detail the construction and operation of various Imperial floats. R. D. McIntosh discussed current developments in valves and fittings and described and exhibited new handy service tools which Imperial recently has designed.

A feature of the meeting was a display stand bearing a sign formed by frosted cooling tubes beat into the shape of the Imperial diamond "I" trade mark. The compressor operating this sign was mounted at the bottom of the stand. In this display a wide range of Imperial products was shown in operation, including siphon type valves, charging units, all types of fittings, high side floats, loaded check valves, liquid indicators, and dehydrators.

There were also display boards showing the complete Imperial line of refrigeration fittings, valves, specialties and tools, and paint spray and welding equipment. Sectional blueprints of various types of floats, valves and cut-away and regular samples were arranged for the inspection of those present.

Following the business session, a buffet lunch was served.

TOUSSAINT WITH PERFECTION

DANIEL H. DASKAL, president, has announced the appointment of Chas. F. Toussaint as Engineering Sales Supervisor in the Automatic Controls Division of the Perfection Refrigeration Parts Co., Harvey, Ill.

Mr. Toussaint has a background of 18 years of specialization in the design, manufacture and sales promotion of Automatic Controls and Regulators for refrigeration and air conditioning. He was the founder and president of the Electrimatic Corp., Chicago, until recently when he severed connections with that corporation.

In announcing this appointment, Mr. Daskal stated that Perfection would shortly introduce several new and complete lines that



CHAS. F. TOUSSAINT

would be of special interest to manufacturers, jobbers and service engineers in the refrigeration, air conditioning and heating fields.

JOBBERS SELLING PRACTICAL INSTRUMENTS

TO furnish the heating and air-conditioning industry with quicker delivery service, Practical recording instruments now are being sold through established jobbers and suppliers. The instruments include a recording thermometer and electrical operation recorder.

Heretofore, all sales were made direct from the factory, but John M. Butler, vice

president of the company, explains that jobber distribution speeds up delivery for the individual buyer because he saves from two to five days shipping time by ordering locally. Jobbers in principal cities in the East, the Middle-West and on the West Coast have already added the instruments to their line.

The company advises all inquirers to buy from a local jobber, but orders are still handled direct from Chicago when the buyer prefers.

Prices through the jobber remain the same, \$18 for thermometers and \$21 for electrical operation recorders. The regular Practical guarantee applies to jobber sales. As has been done in the past, repair service will be given at the factory.

R. Kahn,
Washington.

You have got the magazine that the service man needs. I keep every copy filed in my binder and I have indexed many of the articles to which I can refer as the occasion requires.

R. T. Noble,
California.

I can't say too much for the R. S. E. It surely brings me dope that I need. The Question and Answer department is a great help.



"INDEPENDENTS" HANDLING MILLS NOVELTY CO. SERVICE ARE PHOTOGRAPHED AT
R. S. E. S. CONVENTION

Operation and Application of the Snap-Action Multiple Temperature Valves

**Features, Operating Instructions, Range and Differential
Settings, Schematic Installation, General Information.**

By O. F. NELSON*

THERE are two general types of multiple temperature valves; first, the slow metering or constant pressure type, which range generally from 0 to 40 lbs. pressure and have a non-adjustable differential of approximately 1 lb.; and, second, the Snap-Action Two-Temperature Valve, more frequently called a multiple temperature valve. This latter valve differs from the slow metering valve in that the range and differential are both adjustable over a wide pressure band.

The Snap-Action Multiple Temperature Valve

This valve, regardless of range or differential settings, opens and closes with a positive snapping action at any previously determined settings which are within its limitations.

The positive action of this type valve permits it to be used in any type of installation, or in any combination of dry gas and flooded evaporators as well as to maintain automatically the temperature of one evaporator in a refrigerating system between maximum and minimum limits of temperature variation which may differ widely from the maximum and minimum temperature variations of other evaporators in the same system. With two or more valves in the same multiple system, the different evaporator pressures and temperatures are maintained merely by adjusting the range and differential of the several valves to accomplish the desired results.

* Chief Engineer, Riley Engineering Corp.

Features

We refer to the Snap-Action Multiple Temperature Valve as built by the American Injector Company. Unlike some multiple temperature valves which operate on the pressure side only, this type of valve has an adjustable range from approximately 20 inch vacuum to 60 lbs. pressure in a single valve. The differential is adjustable, varying from 15 inches of vacuum to approximately 29 lbs. at the higher pressure ranges. (Refer to Performance Chart, Fig. 1, for the approximate maximum and minimum settings of the differential and range for this valve.)

Operating Instructions, Two-Temperature Snap-Action Valve

Within the operating limits of the valve as to range (point at which valve opens) and differential (point at which valve closes) the valve clicks open and snaps shut, absolutely tight, as the pressure in the evaporator successively approaches the high and low points at which the valve has been set. Note: Multiple temperature installations are usually operated by a suction pressure control, set to cut in, and cut out, at the pressure controlling the evaporator of lowest temperature.

Range and Differential Settings

All valves are usually "set" to open at 20 lbs. pressure and to close at 18 lbs. pressure differential spring "E" completely retracted, unless other settings are requested by the customer. The erecting or service engineer should make any desired variation of the set-

ting from the above. (See Performance Chart, Fig 1.)

To raise the range (point at which valve opens) turn range adjusting nut "C" clockwise (right). (See Fig. 2.) This will raise the setting at which the valve opens and, also, the point at which the valve closes, by the same amount. The differential does not change by merely changing the range or point at which the valve opens. To lower the range (point at which the valve opens) turn range adjusting nut "C" counter clockwise (left). This again will not change the differential. Note: Unless otherwise ordered, valves are usually shipped with differential spring retracted; hence, at the minimum differential.

Example 1: If the valve is set to open at 20 lbs. pressure and close at 18 lbs. pressure and we wish to raise the pressure at which the valve is to open up to 30 lbs., we turn the adjusting nut "C" clockwise (right) to the desired setting, and the valve then opens at 30 lbs. pressure and closes at 28 lbs. pressure. To increase or widen the differential (differential is number of pounds pressure between valve opening and valve closing) turn differential adjusting screw "B" clockwise (right) with a screw driver, making approximately one or two turns at a time, and watch results on the gauge until the desired differential setting is reached. To decrease

or shorten the differential, turn the adjusting screw "B" counter clockwise (left), thereby decreasing the load on differential spring "E." Note: When changing the differential, the change only takes place at the point where the valve opens (high point—see Performance Chart, Fig. 1).

Example 2: If the valve is set to open at 20 lbs. pressure and close at 18 lbs. pressure, which gives a differential of 7 lbs. pressure, and we wish to increase or widen the differential to 15 lbs. pressure, we turn the adjusting screw "B" clockwise (right) until the gauge shows that the valve is opening at 28 lbs. pressure and closing at 18 lbs. pressure, which gives a 15 lb. differential.

Example 3: If the valve is set to open at 20 lbs. pressure and close at 18 lbs. pressure, indicating a 7 lb. differential pressure, and we wish to raise the point at which the valve opens up to 30 lbs. pressure, and still maintain a 7 lb. differential pressure, we turn range adjusting nut "C" clockwise (right) until valve opens at 30 lbs. pressure and automatically the differential will remain at 7 lbs. and the closing point of the valve will be 28 lbs., indicating, of course, that a change in the range does not change the differential.

Example 4: If the valve is set to open at 35 lbs. and to close at 20 lbs. (15 lbs. differential), the range may be either raised or lowered by turning adjusting nut "C" either

FIG. 1. PERFORMANCE CHART

FIG. 2. HOW RANGE OF VALVE IS ADJUSTED

PERFORMANCE CHART					
WITH DIFFERENTIAL SPRING RETRACTED			WITH DIFFERENTIAL SPRING COMRESSED		
COL. 1	COL. 2	COL. 3	COL. 4	COL. 5	COL. 6
OPEN	CLOSES	MINIMUM DIFF.	OPEN	CLOSES	MAXIMUM DIFF.
45 lbs.	34 lbs.	11 lbs.	63 lbs.	34 lbs.	29 lbs.
40 lbs.	33 lbs.	7 lbs.	59 lbs.	33 lbs.	26 lbs.
35 lbs.	28 lbs.	7 lbs.	53 lbs.	28 lbs.	25 lbs.
30 lbs.	23 lbs.	7 lbs.	47 lbs.	23 lbs.	21 lbs.
20 lbs.	13 lbs.	7 lbs.	37 lbs.	13 lbs.	23 lbs.
10 lbs.	9 lbs.	7 lbs.	25 lbs.	3 lbs.	22 lbs.
7 lbs.	8 lbs.	7 lbs.	23 lbs.	2 lbs.	21 lbs.
0 lbs.	12" vac.	12"	18 lbs.	12" vac.	21 lbs.
5" vac.	18" vac.	13"	15 lbs.	16" vac.	23 lbs.
6" vac.	20" vac.	14"	13 lbs.	17" vac.	22 lbs.

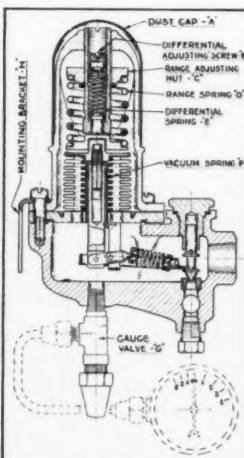
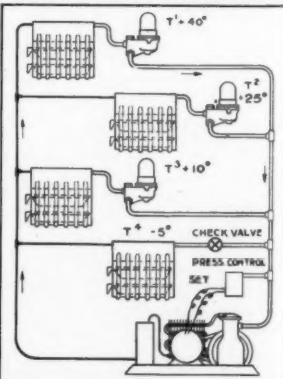


FIG. 3. SHOWING LOCATION OF SNAP-ACTION MULTIPLE TEMPERATURE VALVE CONTROLLING FOUR DIFFERENT EVAPORATOR TEMPERATURES



right or left and the differential will not change. *Note:* The minimum differential as between two valves may vary slightly owing to factory tolerances in the toggle spring pressures, i.e., the differential may be slightly above or below the 7 lbs. indicated in chart.

Schematic Installation

By referring to Fig 3, it will be noted that four evaporators are shown at widely varying temperatures from 40 degrees F. to the lowest at 5 degrees below zero. A Snap-Action Multiple Temperature Valve is at the outlet of each evaporator, except the one held at -5 degrees. A check valve is placed at the outlet of this evaporator to prevent gas from the higher temperature evaporators from entering and condensing in it. The suction pressure control is set to cut in (methyl system) at approximately 6 lbs. pressure, and to cut out at 5 inches vacuum. The Multiple Temperature Valves at the other evaporators are set at proper pressures to maintain the required temperatures.

Any variety of units such as ice cream cabinets, soda fountains, back bars, water coolers, candy counters, beer coils, storage rooms, etc. and etc. may be connected up to a single compressor unit by the use of Multiple Temperature Valves, assuming that there is sufficient capacity in the compressor to handle the greatest possible heat load.

General Information

Whether a slow-metering valve or a snap-action valve is best adapted for any particular installation is frequently a matter of judgment on the part of the erecting engineer. The slow-metering, constant pressure valve is indicated where slight or no temperature variations are permissible in an evaporator. It is frequently used in flooded types of installations such as ice cream cabinets and the high temperature bottle or food compartments.

The Multiple Temperature Snap-Action valve is preferably used in an installation where two or more evaporators are used, and it is also better adapted for dry gas installations, particularly on blower units and dry fin coil evaporators, than the slow-metering valve.

A. S. R. E. TO MEET DECEMBER 2-3-4 IN NEW YORK CITY

A RECORD registration is assured at the 32nd Annual Meeting of The American Society of Refrigerating Engineers, which opens Wednesday morning, December 2, for a three-day session at the Hotel Pennsylvania in New York City. Attendance at this event last year was the best since 1930, and improved business conditions indicate a record crowd this time. All meetings, except the joint meeting with the A. S. M. E. on the morning of December 3, will be held in the Salle Moderne on the roof of the Hotel Pennsylvania.

In addition to the fine schedule of technical papers prepared, an innovation this year will be short informal talks by leaders in the refrigeration and air conditioning field. Gardner Poole of Frosted Foods, Inc., will survey progress in the frozen foods business, L. R. Boulware of Carrier Corporation will talk informally on air conditioning, and George Taubeneck, editor of *Air Conditioning and Refrigeration News*, will report on his recent trip around the world.

A diverting program of entertainment has been arranged for members and their guests and for women attending the convention. At the welcome luncheon on Wednesday the chief speaker will be Howard Ketcham, expert in the important new science of color engineering. The ladies will enjoy a luncheon and bridge party that day, and the same evening Council members and their wives will be entertained at a special dinner. At 9:30 Wednesday evening the whole A.S.R.E. crowd will enjoy a night club party at the Paradise Restaurant. Thursday the women guests will have luncheon at the Rainbow Grill, going on to a matinee. Thursday evening the main social event of the convention, the annual A.S.R.E. dinner dance, will be given at the Pennsylvania Roof.

Officers of the A.S.R.E. this season are Louis S. Morse, President; H. M. Williams, Vice President; Crosby Field, Vice President; C. T. Baker, Treasurer; David L. Fiske, Secretary.

R. S. E. S. 3rd ANNUAL CONVENTION

(Continued from page 28)

How to Figure Compressor Capacities

Following Mr. Wile's address, Mr. Ray F. Polley addressed the convention on, "How to Figure Proper Compressor Capacities for Various Applications." His paper is presented in full on another page of this issue.

Sound Film by duPont

The next event on the program was a sound film on, "The Wonder World of Chemistry," presented by the R. & H. Chemicals Dept. of E. I. duPont deNemours and Company of Wilmington, Delaware. This interesting film pictured the work that chemists are doing in providing for "better living through chemistry."

Comfort Cooling

Mr. A. F. Hoesel, chief engineer of the Peerless Ice Machine Company of Chicago, discussed the subject of, "Comfort Cooling," and in treating this subject Mr. Hoesel said, "The first thing with which we are concerned is, how much cooler should the occupied space be as compared with outside conditions of temperature? Opinion varies on the subject. The customer in many instances believes that the air conditioning should be apparent by the use of comparatively low temperatures. On the other hand, the engineer realizes that the best system of air conditioning is that one which does not intrude itself upon the consciousness of those within the air conditioned space.

"A good average temperature differential as between the inside and outside of an air conditioned space would be 72° F. inside temperature for 75° F. outside temperature, and for every 5° F. increase in outside temperature increase the inside temperature by 2° F. These are dry bulb temperatures. For any certain inside dry bulb temperature, the wet bulb temperature should be 10° F. lower. Accordingly, with 95° outside dry bulb temperature we would have an inside dry bulb temperature of 80° F. and a wet bulb temperature of 70° F."

Mr. Hoesel, in discussing his subject, further said, "I shall not attempt to lay out

a specific job since that will involve numerous calculations which would be difficult to follow within the short time at my disposal, therefore, I shall confine myself to broad principles involved, and by the use of these principles and the necessary data it will be possible to calculate the characteristics and capacity necessary for a cooling system to satisfy the demands of a given job.

"First, The technical tables and data necessary to assign the correct values to varying conditions comprise a psychrometric chart, a heat leakage table for the various types of construction encountered, a table of heat loads due to various appliances, a table of average sensible and latent heat of occupants, and the mean July temperatures of the particular locality of the conditioned space.

"Second, The boundary surfaces of the cooled space are broken down into various areas, which are of common construction and having the same heat transfer through their surfaces. For instance, if we have a dining room in the corner of a large building, we would have an outside wall of a certain type of construction, an inside wall, probably of a different type of construction, a front wall of which the major area would be comprised of glass, a rear wall separating the kitchen and dining room and of entirely different construction than any of the other three walls, a floor and ceiling, each of which might differ from the other. Here we are confronted with six boundary surfaces, each of different construction, having different rates of heat transfer and some having greater temperature differences. Some of these may be exposed to sun effects which materially increase their heat transfer. In this particular case we would have to calculate each area separately and then multiply each area by its correct heat transfer value for the maximum difference we desire to maintain between the outside temperature and the inside temperature.

"Third, We now determine the number and size of the various lights, motors, steam tables, coffee urns, and other appliances which will be within the cooled space, and

assign the proper heat loss, determined from the appliance heat loss chart, and determine the load of all of the appliances.

Fourth, We then determine the maximum number of persons who will be within the cooled space and, if necessary, split them into active and non-active groups. Each group should then be multiplied by the proper sensible and latent heats for a person within that particular group under the particular conditions of inside temperature. Summing these up separately we have a human heat load comprised of both sensible and latent heats which we shall keep separated for purposes to be explained later.

"Each person requires a certain minimum amount of fresh air which in some localities is prescribed by ordinance. Always remember that where heavy odors are present it is well to be sure that enough outside air is taken in to overcome them.

Fifth, The fresh air introduced into the cooled space has two separate heat loads. One is the sensible heat and the other is the latent heat. From the amount of air necessary as determined according to "Fourth" above, and the psychrometric tables mentioned previously, we determine the B.t.u. values of the sensible and latent heat load. We shall keep these separated.

Sixth, We now add up separately the sensible and latent heat loads of 2, 3, 4, and 5 above, thereby determining that a cooling unit of a certain sensible heat capacity and a certain latent heat capacity under the conditions of the entering air mixture will provide the proper capacity for the design conditions.

Seventh, As conditions vary we are confronted with the problem of controlling the capacity of the cooling unit. An absolutely automatic system, responsive to all variations of conditions, involves the use of a large number of instruments. For most small jobs a close differential thermostat, starting and stopping the compressor, will prove sufficient, although a differential thermostat which controls the inside dry bulb temperature in accordance with variations of outside dry bulb will undoubtedly prove more satisfactory since it obviates the necessity of manual adjustment.

Eighth, After we know the C.F.M. air circulation of the cooling unit we are then concerned with the necessary duct work to carry the cooled air to the various points of discharge, and if necessary to return the heated air to the cooling unit. From the standpoint of efficiency in operating and initial costs, square ducts of equivalent area are to be preferred to wide shallow ducts. Do not make the duct sizes too small since this will either increase the necessary fan horsepower for a given C.F.M. air circulation or else result in an air circulation of smaller C.F.M. than contemplated.

Ninth, Supply grilles should be placed as high as possible allowing at least one foot below the ceiling wherever possible. In order to avoid drafts, where the air throw is not too great, it is advisable to use long grilles of small height since the cooled air will diffuse more readily. A common mistake is to use too few grilles and depend upon a high volume discharge. Return grilles should be placed near the floor where practicable.

Tenth, Air filters are a requisite to a real air conditioning job. Calculations are best made in the following order:

S. H. L. H.

a. Transmission Gain in		
B.t.u.'s per hour		
b. Sunlight Gain in		
B.t.u.'s per hour		
c. Other sources of Heat Gain:		
Occupancy in B.t.u.'s,		
per hour		
Electric Load in		
B.t.u.'s, per hour		
Appliance Load in		
B.t.u.'s, per hour		
d. Outside Air Heat Gain		
in B.t.u.'s, per hour		

The total refrigeration load is the sum of all S. H. (sensible heat) and all L. H. (latent heat).

To express this in tons of refrigeration effect, we divide this sum by 12,000 B.t.u., which is the standard rating of heat removal per hour per one ton compressor and/or cooling unit capacity.

"In many cases the contractor will purchase cooling units and compressors from

3rd ANNUAL CONVENTION
REFRIGERATION SERVICE ENGINEERS SOCIETY
HOTEL GAYOSO
NOVEMBER 11, 12, 13 IN 1936.

MEMPHIS TENN.
P. L. ANDO PHOTO.



GROUP PICTURE OF DELEGATES ATTENDING ONE

different sources of supply and connect them on the job; therefore, a word of caution regarding suction line sizes will not be amiss here. Do not use suction lines which, due to the small size of same, impose a large pressure drop between the cooling unit and the compressor. This will result in a decreased capacity of the entire system and in some cases might be serious enough to give the entire job a 'black eye.'

"If for any reason—such as too small suction lines, too large a compressor, or cooling unit slightly under capacity as compared to the compressor capacity—the suction pressure is lower than the job is originally calculated for, do not decrease the compressor speed in order to carry higher suction pressures, without checking the job thoroughly to find out the cause of the decreased suction pressure and then determining whether or not such change will improve the operation, or be justified."

J. F. Nickerson Elected First Honorary Member

President Paul Jacobsen then introduced

a motion for the consideration of the convention which had previously been adopted by the Board of Directors. The motion presented was as follows: "Provision has been made in our Constitution and By-Laws for the election of Honorary Members, who may be elected at any annual meeting upon nomination by the Board of Directors. Conforming with this provision we therefore nominate for Honorary Membership a man whom many of you know and whom many of the new members have not as yet become acquainted with, but the work of the R.S.E.S., its advancement and progress, is a testimonial to his foresightedness and the manner in which he has unselfishly devoted of his time and that of his organization, and financial support in guiding the work of this organization.

"As the publisher of our Official Organ he has been in a position to further the interest of the Society through making known the purposes and objects of this organization to a large number of prospective members.

"The Board of Directors is, therefore, pleased to nominate for Honorary Member-

REFRIGERATION SERVICE ENGINEERS SOCIETY

POWER & LIGHT COMPANY



OF THE BUSINESS SESSIONS. R.S.E.S. CONVENTION

TTENDING ONE

ship, Mr. J. F. Nickerson, as a mark of respect for the accomplishments he has made for this Society."

How to Figure a Truck Installation

Mr. G. D. Wang of Milwaukee was then introduced and presented a paper on, "How to Figure a Specified Truck Installation," which will be presented in the columns of **THE REFRIGERATION SERVICE ENGINEER** in a subsequent issue.

Report of Nominating Committee

The next order of business was the report of the Nominating Committee and the election of officers. Mr. George O'Hara of Buffalo presented the following officers as the recommendations of the Nominating Committee:

PRESIDENT—Paul Jacobsen, Chicago

1st **VICE-PRESIDENT**—W. Hall Moss,
Memphis

2nd **VICE-PRESIDENT**—C. A. Brunton, Huntington, W. Va.

TREASURER—S. A. Leitner, Kansas City

SECRETARY—H. T. McDermott, Chicago

SERGEANT-AT-ARMS—E. A. Plesskott, St. Louis

BOARD OF DIRECTORS—W. W. Farr, Lakewood, Ohio; C. O. McCauley, Pittsburgh; D. B. Schuster, Buffalo; A. E. Doan, Weston, Ont., Canada; C. Buschkopf, Beaver Dam, Wis.

Additional nominations were requested by President Jacobsen from the floor. The final outcome of the election resulted in the selection of the officers as proposed by the Nominating Committee.

The convention then adjourned until 1:30 P. M. on Friday.

Third Day—Friday, November 13th

THE meeting was opened by President Jacobsen, who turned over the gavel to Mr. George H. Clark, who conducted the Question Box for a period of one-half hour, answering questions that were presented from the floor.

(Continued on Page 74)

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

YES, WE'RE LATE

THIS issue of THE REFRIGERATION SERVICE ENGINEER is late in mailing. The reason for this delay is principally due to the fact that it contains a comprehensive report of the proceedings of the R.S.E.S. Convention, which we know will be of interest to all of the readers of our journal, whether members of the Society or not. Its educational papers will have a wide appeal to the greatest majority of our subscribers, and we want to present them with this news while it is current.

You will pardon us for this delay, won't you? Incidentally, this issue contains the largest number of pages of reading matter of any issue published since its start.

THE MEMPHIS CONVENTIONS

SERVICE men, manufacturers of refrigeration parts and accessories, and refrigeration parts jobbers met in Memphis to discuss their problems and adopt programs for the guidance of their respective business interests for the coming year.

Those who attended could not help being impressed with the spirit which prevailed, and the anxiety of all to contribute their

share in working for the advancement of the refrigeration industry.

The definite accomplishments of these meetings will result in a better appreciation of the interests of all concerned.

The cooperative efforts of these groups is a testimonial to the productiveness of the work that conventions can accomplish in protecting the investment of those engaged in the business, whether manufacturing, selling, installing or buying. The industry, as industries go, is still young, but it is a mighty important factor in the volume of business that it does today, and again, we say that the success of these meetings will be definitely shown in the advancement the refrigeration business in its entirety will make during 1937.

WINTER SALES

IN order to compensate for the decided drop-off in winter servicing, some thought should be given as to how this situation can best be handled. A large part of refrigerator sales work has been devoted to the idea of selling "modernity." Why cannot the service man adopt the same practice? There are a tremendous number of domestic refrigerators five years and older that could be modernized with the installation of a new evaporator, a modern cold control, new gasketing material, refrigerator dishes and hardware. Here is an opportunity for the service man to do a constructive job in soliciting his customers on the theme of modernizing the mechanical refrigerator. It's a profitable winter business.

J. F. Macdonald,
Australia

May I add my praise of the magazine; it's the finest trade or professional magazine I've seen—one word sums it up—Indispensable.

J. R. DAVIS, New York.

Enclosed is my renewal for the R.S.E. I have been one of the pioneer independents and thought I was pretty well informed on the business. Yet I have learned many new things since I have been receiving my copies of the R.S.E.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.



THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

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1936-1937

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4125 Grand River Ave., Detroit, Mich.

THE PRESIDENT'S MESSAGE

ANOTHER successful year has been brought to a close with an equally successful convention, and it is time we sit down and analyze the results of past performances and make plans for the future progress of our Society.

We have, during the past few years, received a great deal of recognition and benefit from manufacturers and other associations; recognition in the way of exhibits and educational matters heretofore available only to the manufacturers' own employees and those closely associated with the factories in the capacity of distributors and dealers.

We have received cooperation from other societies in our plans to establish standard symbols for machines and complete installations.

Our plans now should be for a standardized service which will benefit both the consumers and manufacturers, and ourselves; plans which will take the guess-work out of the servicing business and put it on a paying basis where we can all make a profit, satisfy the majority, and establish a good reputation for ourselves.

The three most important tasks for us to tackle now are: a substantial increase in membership, more specialized information about machines, and a complete cost system so each member can easily and quickly determine whether or not he is making money, and where his losses are.

To accomplish these things it is necessary

that we have the full cooperation of the entire membership, and we urge you to write us often, send us suggestions, which you have found to benefit yourself, and let others learn something new. Tell us what you would like to have the Society do for you, and we shall do our best to fulfill your requests. Do not leave all the work to a few members; get in the swing of the organization yourself. Remember, the more you put into the organization the more, and in multiplied measure, you benefit in return.

Start this year right by writing us and discover a new phase of this Society which, possibly, you have never known before.

PAUL JACOBSEN, *National President*

"THE 'CONTRIBS' COLUM"

By THE KINGFISH

GENERAL impressions from the convention:

The smoothness of performance.

Edna Christensen at the registration booth.

Dan Wile's talk.

"Gems of American Architecture" by Rotary Seal Co.

Pittsburgh stogies.

Paul Jacobsen swinging the gavel.

The Mississippi River.

McLaughlin and his pipe.

Ray Polley and his Mills novelties.

Police Commissioner Davis.

McKinley from Fort Worth, Texas.

Ansol's refrigerator ensemble.

The Colonnade parties.

Cutler-Hammer's "tick-tock" bellows tester.

Marion Uetz's charming "touch" on all arrangements.

The Kingfish and his "better half."

The Beale Street Palace.

Ed Wright's countenance.

Virginia Smelting Company's humistat and dryer.

McDermott's worried expression.

Universally beautiful exhibits.

White mules and "darkies" picking cotton.

McCauley in conference with his delegates.

The Chicago convention committee.

The \$1.00 toll bridge fee.

Harry Alter's walking sticks.

General Electric's refrigerator under glass.

The Cleveland gang.

A Mississippi steamboat.

du Pont's R. & H. film—"The Wonder World of Chemistry."

The photographer who forgot to load the camera.

The Arkansas gasoline tax.

Steve Leitner and his Kansas City gang in red and white sweaters.

The "dryness" of Memphis.

The sweat on Herman Goldberg's forehead.

Joe Askin's list of symbols.

Hans Jensen's "HOW."

The Buffalo orator—George Wilson.

Clay and his Dole plates.

Various sales talks for the 1937 convention.

Fedders' air-conditioned house.

How's you all doin', honey?

Boyd Evans' supply house in Memphis.

The prompt room service at the Hotel Gayoso.

The start of a Ladies' Auxiliary.

To Chicago in 1937.

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Rockford, Illinois, and St. Joseph, Missouri, Apply for Charters

Rockford Chapter

M R. GEORGE MONJIAN, member of Chicago Chapter, assisted in the formation of Rockford, Illinois, Chapter. On October 12 Mr. Monjian and President Paul Jacobsen met with a group of service men from Rockford and vicinity and the result of the meeting was the application for a charter from the National Society.

On October 21, President Jacobsen and Mr. Monjian again journeyed to Rockford to present the charter to this newest chapter. Temporary officers elected for the guidance of the chapter are: President, George E. Moon; Treasurer, E. T. Reynolds, Jr.; Secretary, Walter W. Larson.

St. Joseph, Missouri Chapter

Through the efforts of President Roy Cox of Kansas City Chapter and Mr. S. A. Leiter, national treasurer of the R.S.E.S., and

the cooperation of the service men of St. Joseph, Missouri, a petition for charter for a local chapter was presented at the convention of the National Society in Memphis. This petition for charter was presented in person by Mr. E. J. Storm, temporary president and Mr. H. E. Young, temporary secretary, accompanied by Mr. F. Pollock.

Favorable action on this petition was taken, and the new chapter will receive its charter in the near future.

PITTSBURGH CHAPTER

Meeting of October 12, 1936

By F. V. GOLITZ, Secretary
1518 Davis Ave., Pittsburgh, Pa.

THE regular meeting of October 12 was held in the Corporation Room of the Commonwealth Building, President C. O. McCauley presiding. Attendance was forty members and visitors.

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EXACT REPLACEMENTS

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RANCOSTAT

Mr. McCauley announced the special meeting to be held on October 19th at 5624 Penn Avenue under the auspices of the Electric Products Corporation. The invitation was extended by Mr. H. A. Schreiber to all members and friends.

The election of the delegate and the alternate resulted in the election of John Kirch as delegate and V. C. Waight as alternate.

It was moved by Mr. Biber and seconded by Mr. Weston that the delegates' train fare be paid by the Pittsburgh Chapter. Motion carried.

The ways and means for preventing the catalogs with net prices from getting into the hands of persons not connected with the servicing profession was discussed. Mr. H. S. McCloud, president of the National Refrigeration Supply Jobbers' Association, reported on the steps that his organization is contemplating taking to correct this evil.

Mr. N. D. Wagener was introduced and gave a talk and demonstration of a refrigerator analyzer he has developed and patented. The analyzer consists of: a tem-

perature indicator, a fin temperature indicator, box temperature indicator, compound gage, high pressure gage, packless valves for manipulating these gages and ports, a voltmeter, ammeter, a line fuse and switch. These instruments were mounted on an aluminum panel and housed in a leatherette case. It was the opinion of the assembly that this should be a popular service tool for the service man. On behalf of the members and officers, Mr. McCauley thanked Mr. Wagener for his talk and demonstration.

The Membership Committee reported favorably on three new applications for membership.

Special Meeting of October 19, 1936

The Electric Products Corporation, Frigidaire distributors, were hosts to the Pittsburgh Chapter on October 19 in their quarters at 5624 Penn Avenue.

The meeting was opened by Mr. H. A. Schreiber, who welcomed the members and visitors. Mr. Schreiber explained the policies and products of the Frigidaire Corporation. The supplies and equipment distributed by

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A HAPPY RE-UNION

It was a great pleasure to meet so many of our graduates at the Memphis convention of the R. S. E. S., and to learn of their splendid progress and good fortunes. We look forward to many more similar meetings and extend our every good wish to the Refrigeration Service Engineers' Society for its continued success.

Utilities Engineering Institute
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BLUE RIBBON . . .
AUTOMATIC SUCTION PRESSURE
THROTTLING VALVE

This valve installed at or near the suction inlet port of the compressor will relieve the serious difficulty experienced at times with practically every commercial installation, particularly flooded type systems—such as an overloaded motor condition due to high back pressures which are beyond the capacity of the motor to handle continuously without dangerous overloads. Conditions of this kind are indicated by abnormally high head pressures, frequency of cycling, blown fuses or burned-out motors.

WRITE FOR BULLETIN NO. 16 GIVING FULL INFORMATION.
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the Electric Products Corporation were displayed. After a general discussion, refreshments were served and door prizes distributed. The major prize was a leak detector and was awarded to Al. P. Amrheim.

TWIN CITIES CHAPTER

Meeting of October 13, 1936

By J. SAMWAYS, Secretary
3015 Clinton Ave., S., Minneapolis, Minn.

THE meeting was called to order by President Johansen and the minutes of the previous meeting were read and accepted.

The Treasurer's report was called for and accepted as read.

A discussion followed on a meeting place for the Society. Of several places suggested, the meeting room at the Midway "Y," 1977 University Avenue, St. Paul, was chosen because of the low rental and central location. Motion was carried that the Midway "Y" meeting room be engaged for the second Tuesday each month.

A discussion on the National Convention

at Memphis followed. Mr. Small was nominated to represent Twin Cities Chapter at the convention.

Mr. Tupper was then called on to go over the first Lecture Course given out by the National Society. Mr. Tupper covered the first lecture in an excellent manner.

KANSAS CITY CHAPTER

Meeting of October 13, 1936

By R. E. KINGSLWER, Secretary
2212 East 38th St., Kansas City, Mo.

PRESIDENT ROY COX read communications as follows: one from the Frigidaire Corporation inviting Kansas City Chapter to their meeting of November 8 in their Lecture Room, for which Frigidaire will furnish a speaker and refreshments; another from Mr. Bruce of St. Joseph, Missouri, regarding the formation of a local chapter of the R.S.E.S. in that city; and the resignation of Mr. C. F. Ramey as treasurer of Kansas City Chapter.

Secretary R. E. Kingsolver was appointed by President Cox to fulfill the unexpired

FOR QUICK JOINTS IN THREADLESS COPPER PIPE AND FITTINGS



IDEAL THERMOCOUPLE PLIERS heat electrically and grip two sides of the job at once. For all soldering jobs up to 4" diameter. No hazardous open flame. Usable in cramped places, in any position. Literature on request.

IDEAL COMMUTATOR DRESSER CO.
1093 Park Ave. SYCAMORE, ILLINOIS

**A complete line of
Refrigeration Parts**
of all standard makes carried
in stock at all times—we ship
your order the same day it is
received.

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H. W. BLYTHE COMPANY
PHONE CALUMET 2228
2334 S. MICHIGAN AVENUE, CHICAGO

KRUPP WATER REGULATOR

for Methyl-
Freon-Sulphur



A regulator featuring elimination of the stuffing box and dash pot. Water valve body assembly is made of bronze and rust-proof material, and has renewable rubber composition seat. Seat guide assures tight closing and perfect alignment, the frame is designed so that adjustment can be made easily. Noiseless in operation.

Bulletins and prices upon request.

CYRUS SHANK CO.
625-631 W. Jackson Blvd.
CHICAGO, ILL.

Manufacturers of Krupp Valves for
Mechanical Refrigeration

SECOND ANNUAL STAG GIVEN BY CHICAGO CHAPTER, R.S.E.S., OCTOBER 27, 1936

SECOND ANNUAL SMOKER AND VAUDEVILLE
CHICAGO CHAPTER R.S.E.S.
HEADQUARTERS STEVENS HOTEL OCTOBER 27, 1936



November, 1936

term of Treasurer Ramey.

Fourteen members signified their intention of attending the convention at Memphis.

We were honored to have with us Mr. Soderberg of Wichita, Kansas, a member-at-large of the R.S.E.S.

CHICAGO CHAPTER'S BIG STAG

CHICAGO Chapter marked up another eventful evening on October 27. It was the occasion of the Second Annual Stag, and some 200 members and visitors were in attendance. Visitors included members of Milwaukee and Rockford Chapters, as well as guests from several neighboring cities.

The entertainment was arranged by Mr. Herman Goldberg, chairman of the Chicago Entertainment Committee. The Tower Ball Room of the Stevens Hotel was the scene of the Stag. The Stag also served to inspire the members to work for the 1937 convention in Chicago.

President Paul Jacobsen was pleasantly surprised when Herman Goldberg, on behalf of Chicago Chapter, presented Paul with a

wrist watch in appreciation of the work which he has accomplished as president of Chicago Chapter for the past two terms.



President Paul Jacobsen is presented watch from Chicago Chapter by Herman Goldberg

GEORGE HASSELL, Illinois.

I have every issue of the R.S.E. from the first number. It certainly has been a great help to me.

Condensing Unit
Style D7-MA



THE STARR COMPANY, Richmond, Ind., U. S. A.

222 N. Vermont Ave.
Los Angeles, Calif.

2025-1st Ave. North
Birmingham, Ala.

STARR FREEZE

DEPENDABLE COMPRESSORS AND CONDENSING UNITS

1-2-4 Cylinders— $\frac{1}{2}$ to 10 H.P.

The most profitable and complete line to select from—just the size to build that refrigerator,—to assemble that condensing unit or to replace that old worn-out compressor.



1222 Huron Road
Cleveland, Ohio

Compressor
Style J



Deluxe Scurlock Kontanerette Kits

Many distributors and dealers are increasing their sales of refrigerators at this quiet season of the year by the addition of Scurlock Deluxe Kontanerette Kits. We can supply you these Kits to the retail value of from \$2.75 up to \$11.00. One large refrigerator company last year at this time moved five thousand refrigerators that they were unable to sell during the current season with the addition of some Deluxe Kontanerette equipment to the refrigerator. It will help your sales, as it is helping others. Write us for information on a new Deluxe outfit listing at \$11.00. It is about the finest thing ever put in a refrigerator. Address the

Scurlock Kontanerette Corporation
1477 Merchandise Mart, Refg. Dept., Chicago

ST. LOUIS CHAPTER

Meeting of October 22, 1936

By E. A. PLESSKOTT, President
2145 67th St., St. Louis, Mo.

IN the absence of Mr. Gygax, the speaker of the evening, Mr. G. W. Schalchlin of the Allen-Bradley Company, manufacturers of control equipment, was introduced by President Plesskott.

Mr. Schalchlin spoke at length on the desirability of the refrigeration engineer knowing enough about the various controls to be able to help himself at all times when confronted with troubles of this nature. With the aid of diagrams and the actual controls hooked up on a board, he explained the various uses and capacities of the different models, stating that almost any conceivable problem can be met by control manufacturers, but to be sure to see that they are hooked up as directed in order to function as intended.

A short recess was called at the conclusion of his talk, and permission to leave was

given, as there was to be only a short business session.

Correspondence from Buffalo Chapter and Mr. Gygax was read. Highway conditions to Memphis were discussed, and the members were advised that a special meeting would be called on November 19th.

MEMPHIS CHAPTER

Meeting of September 7, 1936

By R. F. WEIDLEIN, Secretary
765 Ellsworth, Memphis, Tenn.

MEMBERS of the License and Code Committee were asked to meet with President Uetz at his office on Thursday at 1:00 p.m.

Various communications received were read and disposed of.

Motion was made by W. C. Easley that we return to our regular meetings on every Monday night. Motion seconded by Mr. Brakefield, and carried.

Mr. Easley, chairman of the Educational Committee, introduced Mr. Sherman and

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PLEASANT MEMORIES

Mighty glad to have met our friends and customers at the recent convention of the R.S.E.S. It was a happy occasion and one that permitted us to get better acquainted with you and your needs and problems. We stand ready to serve you as efficiently in the future as we have in the past, and shall endeavor always to merit your continued patronage.

WHAT ARE YOUR IMMEDIATE REQUIREMENTS?
AIRO SUPPLY CO. 408-410 N. Wells St.
CHICAGO, ILL.

FREE CATALOG AND BUYERS GUIDE

Mr. Askin of the Fedders Manufacturing Company, who gave a lecture on their products and showed a motion picture in conjunction with same. We certainly hope they will be able to meet with us again in the very near future.

President Uetz took charge at 9:30 p.m. and the following visitors were introduced: Mr. Murphy of the Woodson Bozeman Company, Mr. Emery of the Hughes Heating Company, and Mr. Warren of the Lawrence Furniture Company.

Meeting was then closed and all helped themselves to sandwiches, cakes and good old "51"—thanks to Fedders.

CHICAGO CHAPTER

Meeting of October 8, 1936

By WILLIS STAFFORD, Secretary
726 Hinman St., Aurora, Ill.

AT this meeting there was no regular business session. The meeting was spent enjoying the hospitality of the Imperial Brass Company, who gave an interesting demonstration of their products, and a very nice buffet lunch.

Meeting of October 27, 1936

This meeting was the date of our Annual Smoker and Stag party. No business meeting was held. Everybody had a grand time, enjoying the show that was put on under the very able direction of the Entertainment Committee.

In behalf of the Chicago Chapter, for the splendid job he has done as our President, Mr. Paul Jacobsen was presented with a beautiful Hamilton wrist watch. The presentation was made by Mr. Herman Goldberg.

CENTRAL NEW YORK CHAPTER RECEIVES CHARTER

AT a dinner meeting held in the Hotel Syracuse, October 19, Central New York Chapter met for the purpose of receiving their charter as a regular constituent chapter of the National Society.

President Carl Stewart presided at the meeting and, after a repast that delighted the inner man, he stated the purpose of the

"Chieftain" Quality Built Compressors

and

Condensing Units



See Your Jobber

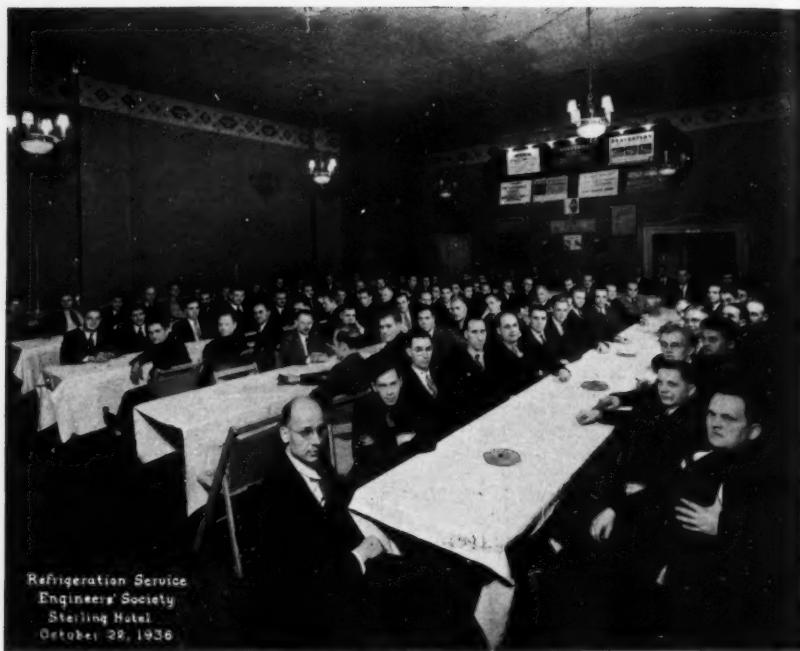
For Literature and Prices on Our Complete Line

Save money by installing "Chieftain" Compressors instead of trying to satisfy exacting customers with rebuilt compressors or condensing units.

"Chieftain" Compressors are made to last. Precision limits are maintained on all parts. Our new and exclusive lubrication system insures longer life and higher efficiency, as well as a quiet operating unit.

In addition to quality we offer prices that will permit you to make a higher percentage of profit as well as a saving of time, which will enable you to satisfactorily handle a larger volume of business.

TECUMSEH PRODUCTS COMPANY, Tecumseh, Michigan
Refrigeration Division



Refrigeration Service
Engineers' Society
Sterling Hotel
October 22, 1936

CLEVELAND CHAPTER HOLDS A DINNER ON OCTOBER 22, 1936

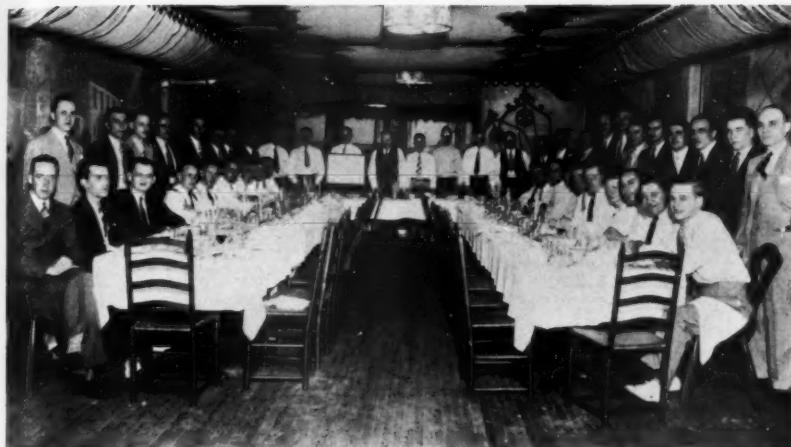
meeting, and called upon National Secretary H. T. McDermott. The National Secretary expressed his appreciation of having the opportunity of meeting on this occasion, and proceeded to present the charter to this new chapter.

FLYING SERVICE MAN MEMBER
OF R.S.E.S.

DON RANSDELL of Liberal, Kansas, a member of Kansas City Chapter, R.S.E.S., lays claim to being the first refrigeration



DON RANSDELL AND HIS REFRIGERATION SERVICE PLANE



GROUP ATTENDING CHARTER PRESENTATION, NIAGARA FRONTIER CHAPTER,
BUFFALO, N. Y.

tion service man to make his calls by airplane. Don hops from town to town, landing most anywhere he wants to on the Kansas prairie. To our knowledge, he has the distinction of being the first flying service

man. The picture shows Don ready to take off in his plane with his service kit, all ready to make a call.

The editor also understands that we have another flyer in the ranks of the Society, al-

REFRIGERATION PARTS

DOMESTIC • COMMERCIAL
AIR CONDITIONING

100% WHOLESALE
*"We protect
the Dealer"*

A GREAT CONVENTION

THE Convention of the Refrigeration Service Engineer's Society held at Memphis has shown in an outstanding way the progressive spirit prevailing in the industry. We are proud to be associated with it. To those who visited our booth, we extend our appreciation.

Request Our New Big Catalog

You'll like our speedy service. Our large stock and efficient organization enable us to dispatch your orders promptly—same day service in almost all cases. Ask for our latest catalog on your business letterhead.

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Complete Line



Write for New Catalog 51: Strainers, Dryers,
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TYPE 890 SMALL STRAINER

With cup-shaped screen having 50% more capacity than usual flat disc. Soldered copper shell.



FLANGED SHELL Dehydrator With Dispersion Tube

Less pressure drop. More efficient. Easier to refill. Copper shell. Forged steel distortion-proof flange. Tongue-and-groove, recessed-gasket joint. Shell diameters: 2" to 4½". Dehydrant capacity: 13.5 to 230 cu. in. Flare or union solder type fittings.



"Y" STRAINER

For Copper Pipe

Exceptional design. Negligible pressure drop. Accessible clean-out flange. Large screen area. Light weight. Baffle prevents injury to screen. Oil trapping prevented by installing on side or in vertical position. Liquid lines: 80 mesh. Suction lines: 50 mesh.

SOLD BY ALL LEADING JOBBERS

Henry Valve Co.

1005-19 N. Spaulding Ave., Chicago, Ill.

though he does not use this method of transportation to make his service calls. He is Joe Carter of Memphis Chapter, who flies for pleasure.

Possibly, at our Chicago Convention, both of these boys will decide to make the trip by their respective planes.

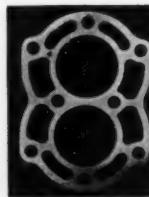
NEW COMMERCIAL CONDENSING UNITS FOR REPLACEMENT SERVICE

A NEW commercial unit—new in design—direct drive compressor—is now being marketed through the Commercial Refrigeration Co., Inc., of 55 South Avenue, Rochester, New York. Model MRK-JR can be used almost universally as a replacement condensing unit wherever a $\frac{1}{6}$ or $\frac{1}{4}$ -hp. unit should be used. Model MRK-SR can be used wherever a $\frac{1}{2}$ -hp. unit is required.

The entire unit is encased in a soundproof metal hood, and is only 7 inches overall in height. The manufacturer claims that only two horizontal and two vertical tie bolts hold the few simple compressor parts and entire compressor assembly in perfect and precise alignment with motor shaft, and detachable cylinder, and cylinder head with the crankcase.

The compressor assembly is entirely independent of the motor; therefore, if necessary, the complete compressor assembly or motor can be changed independently of each other.

A new exclusive radial crankcase design permits the tilting of the cylinder from a vertical position to a 45° angle right or left, in order to save head room, if desired. There



Replacement Gaskets

A real service for servicemen. We carry in stock, stocks, and have on hand, every model of practically every unit ever built. All gaskets packed in uniform boxes, with manufacturer's part number and quantity. 24 hour shipping service.

CHICAGO-WILCOX MFG. CO.

7701 Avalon Ave., Chicago

are no tap holes in the entire compressor assembly, making it is claimed, a tight, seepage-proof unit.

Complete information on this new replacement condensing unit can be secured from the manufacturer.

WEATHERHEAD COMPANY PURCHASES NEW PLANT

THE Weatherhead Company of Cleveland recently announced the purchase of the former Hupmobile plant in that city.

The group consists of two monitor type buildings, a four story factory and a five story office building. These new quarters of approximately a half million square feet of floor space give the company more than double the area it has been occupying in six different buildings the last few years. With its new location, the company will have greatly increased general and factory office facilities.

Mr. Albert J. Weatherhead, Jr., president of the company, states that the growth of the business made the purchase of the new plant imperative. Over 1200 men are employed in the production of automobile and refrigerator parts of brass, steel, and aluminum. The company also has a number of other lines such as freezometers, hydrometers, flexible hose and brake fluid.

New machinery is being installed at the new location. All manufacturing and office personnel will be moved to the new plant as rapidly as possible, without, however, stopping production on any of the company's products. The site of the new plant is on East 131st Street near Taft Avenue, Cleveland.

VIEWS AND REVIEWS

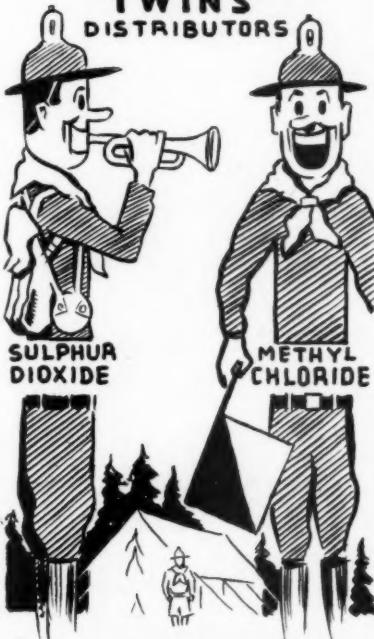
By HERMAN GOLDBERG, Chicago Chapter

A NUMBER of readers have written me since my last month's article, the essence of practically all of their letters being the same, in that they wish to know whether there is any conclusive proof that times are permanently now on the up-grade.

In my mind we need no more conclusive proof than the fact that good skilled labor

(Continued on page 73)

BE PREPARED TO GIVE SERVICE IS THE MOTTO OF THE **ANSUL** TWIN'S DISTRIBUTORS

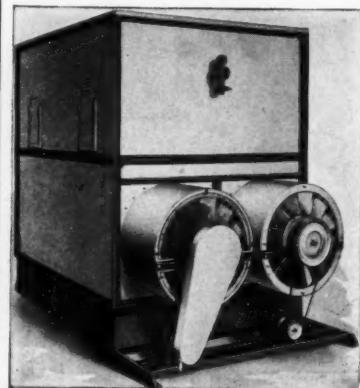


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IN ALL IMPORTANT CITIES

ANSUL
CHEMICAL COMPANY
MARINETTE WISCONSIN

BINKS SPRAY COOLING TOWERS

Indoor Forced Draft Type Will Save Money for You!



What happens to the circulating water after it passes through your Ice Machine Condensers?

If discharged to waste you are literally pouring good hard earned dollars down the sewer! Check your water bills . . . see how much you are throwing away. You'll be surprised.

A Binks Cooling Tower permits the constant recirculation of the required supply, cooling and using it over and over again and again, substituting a small pumping charge for the former heavy water bills.

There are more than three thousand Binks Cooling Towers now in operation including sizes for all standard commercial refrigeration units. Let us tell you more about it, and how YOU TOO can cut the water costs of your present equipment by as much as eighty per cent.

Write Today for Bulletin No. 70

BINKS MANUFACTURING CO.
3151 Carroll Ave. Windsor, Ontario-Canada CHICAGO, ILL.

Refrigeration Service Engineers!

when in Chicago
make your
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H. CHANNON CO.
133 N. WACKER DRIVE

The latch-string is
always out to YOU!

November, 1936

72

THE REFRIGERATION

- 1 Art Institute
- 2 Board of Trade
- 3 Chicago Security Buildings
- 4 Federal Building
- 5 Merchandise Mart
- 6 Post Office
- 7 Public Library
- 8 Chicago & Northwestern Station
- 9 Chicago North Shore R. R.
- 10 Dearborn Station
- 11 Grand Central Station
- 12 Illinois Central Station
- 13 Le Salle Street Station
- 14 Twelfth Street Station
- 15 Union Station
- 16 Wells Street Station
- 17 Kenneth Kitchum Studios
- 18 H. Channon Co.

Loop of Chicago



VIEWS AND REVIEWS

(Continued from page 71)

in all lines already is becoming scarce, and that a large number of employers are beginning to train men in specific lines of endeavor to fill the labor demand which they see may affect their various plants in the future.

Another basic sign, of course, is the increasing cost of all commodities and it is a well-known fact that bank deposits throughout the country are increasing tremendously daily.

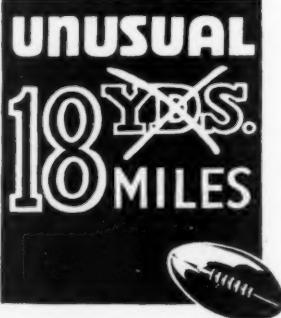
It is no secret that all of the major organizations in the refrigeration and air conditioning industry are increasing their facilities for an expected increase in business which will come when public confidence suddenly surges over.

This will be when the average consumer feels that he can safely indulge in purchasing a number of commodities because of a feeling of security due to a fair bank balance as well as an assured income from salary or other means.

The above viewpoints are shared not only by the various large industrialists but also by the business men in general who were in business before the depression and who were fortunate enough to survive it up to now.

It is my opinion that operators in our industry, both large and small, would do well to look into the prospective business which can be secured from and through the building trades. Unquestionably, during the next building boom which appears to be not so far away now, air conditioning and refrigeration are going to play a prominent part. The possibilities from this alone appear to be tremendous, and I believe the smart small operator will study this situation very carefully.

Because of the fact that the refrigeration and air conditioning industry is one of the few that has not only developed to a higher degree but also proved profitable in spite of the depression, those of us who are in this business should certainly look forward to happier conditions once our allied industries also become more prosperous.



REFRIGERATION PARTS AND SUPPLIES

FACTS IN SPORTS

CARRIES BALL OVER 18 MILES

Up to the time Red Grange retired from football in 1935, he carried the ball a total distance of a little over 18.6 miles. Four thousand times he luggered the ball for an average gain of 8 1/4 yards.

Here Also Is a Profit Gaining Service

The Borg Warner reputation for "ontime" delivery has set up a new standard in the refrigeration jobbing business. Here is an organization imbued with the sincere spirit to win the right to all of your business. Send that next order to Borg Warner and note the difference.

Our Catalog Is Yours for the Asking



BORG WARNER SERVICE PARTS CO.
Division Borg-Warner Corporation
2100 Indiana Avenue Chicago, Illinois

R.S.E.S. CONVENTION—Continued from Page 57

Force Draft Unit Coolers

The Friday afternoon session was formally opened by a paper by Mr. Joe Askin, chief engineer of the Fedders Manufacturing Company of Buffalo, who presented the subject, "Forcedraft Unit Coolers—How to Use Them and Specific Examples of How to Figure." This paper will be printed in full in a subsequent issue of THE REFRIGERATION SERVICE ENGINEER.

Licensing Regulations

Following Mr. Askin, Mr. George L. Uetz spoke on "Licensing Regulations" and the factors that should be considered in proposing licensing ordinances.

Reports from the various chapter delegates were then requested and as Secretary McDermott called the delegates' names they responded in behalf of their chapters.

Invitations for Convention City

Invitations for the next convention city were then invited and Buffalo, Chicago, Cleveland and Pittsburgh extended their invitations to hold the Fourth Annual Convention in their respective cities. After the reports of the various convention committees, the convention adjourned.

Ladies' Auxiliary

Under unfinished business a resolution was introduced that the Society encourage and assist the activity of the ladies attending the convention in sponsoring a National Ladies' Auxiliary, and that the Board of Directors designate the name of one of the ladies to serve as chairlady of this organization for the ensuing year, and that additional regional chairladies be appointed at a later date. In view of the splendid work done by Mrs. Marion Uetz of Memphis, it was suggested that the Board of Directors designate her as the first Chairlady.

The meeting then adjourned, and immediately following the Board of Directors met and selected Chicago as the 1937 convention city and adopted the suggestion of the resolution presented and appointed Mrs. Marion Uetz as the first Chairlady.

Entertainment Program Keeps Convention Busy

The Memphis Entertainment Committee

realized that entertainment for the members and guests is essential to the success of a convention; therefore, a full program of three days of entertainment kept the convention attendants busy during the period when they were not inspecting exhibits or attending the business sessions.

Memphis Chapter Party

On Wednesday, the first day of the convention, Memphis Chapter acted as hosts at a Memphis Party conducted in the Colonnade Night Club of the Hotel Gayoso. Dancing and a general get-together was the order of the evening from 9 p. m. until the early hours of Thursday morning.

Thursday morning, seven large buses left the Hotel Gayoso for a two-hour tour of the city, which afforded a picture of the business and residential sections of Memphis. Thursday evening the annual banquet was held at 8 p. m., with dancing until 11 p. m., when the assemblage left for the Beale St. Palace to enjoy a vaudeville show in this renowned old theatre.

On Friday evening, another party, which was termed the Exhibitors' Frolic, was held in the Colonnade Room of the Gayoso Hotel, which concluded the action and festivities of the three-day convention.

Ladies' Entertainment

The Ladies' Entertainment Committee, under the capable supervision of Mrs. Marion Uetz, chairlady, assisted by Mrs. Velma Evans and Mrs. Marguerite Bridges, assumed the responsibility of keeping the visiting ladies occupied while the business sessions were being conducted.

The ladies attended all of the general entertainment features, and each afternoon had a special party for themselves. On Wednesday, a Bingo Party was held in the Colonnade Room; on Thursday, an entertainment and party; on Friday, a luncheon.

The spirit of the convention so enthused the ladies that it was decided to form a National Ladies Auxiliary, which undoubtedly will be an important part of future conventions.

Announcing

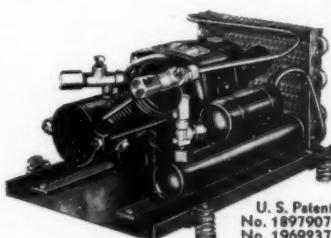
Striking, new, direct drive condensing units



This entire unit is enclosed in a removable sound-proof metal hood. The compressor assembly is independent of the motor, although direct-driven. If necessary, the compressor assembly or motor may be changed independently. The exclusive radial crankcase design permits tilting to a 45° angle in order to save head room, if necessary.

Model MRK-JR is almost universal as a replacement condensing unit whenever a $\frac{1}{6}$ -hp. or $\frac{1}{4}$ -hp. unit should be used. Model MRK-SR can be applied whenever a $\frac{1}{3}$ -hp. unit is required. Upon request, prices and any further information will be gladly forwarded.

COMMERCIAL REFRIGERATION COMPANY, Inc.
55 South Avenue
ROCHESTER **NEW YORK**



U. S. Patents
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No. 1969237
No. 2018067
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GO to GILMER . . .

Headquarters will help You solve your V-Drive Problems

Engineers trust Gilmer V-Belts, built by engineers. *Gilmers last longer on fractional horsepower drives. Gilmers grip tighter. Gilmers stay quiet.*

Five fighting features distinguish Gilmer Single Strand V-Belts: (1) Top Rubber — Heat-resisting tension rubber that instantly flexes to fit the groove; (2) Pulling Cord — Endless, heavy, strong — locked in thin section which gives maximum strength *on the sheave*, and keeps pulling section in constant tension, producing perfect "plane of pull"; (3) Bottom Rubber — Special composition, to support pulling cord firmly; (4) Double Jacket — Bias fabric, more than tripling the wear; (5) Controlled Stretch — Built to insure correct working length under any load, at any speed.

Gilmer V-Belts for all sizes of small-unit drives on all types of equipment are shown in Gilmer catalogue, sleeved and plainly marked. Get your copy today.

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"GILMER MEANS V-BELTS ALL OVER THE WORLD"



To be sure!

Safeguard Against Fumes With HEALTHGUARD FUME KIT



The lightest, most comfortable and convenient outfit for use when there is work to be done in fumes. When needed, it is needed; so have it along on the job! Mask forms an air seal—instantly fitted. Cartridges for ammonia, sulphur dioxide and methyl chloride. Write for details.

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SHIELD CO.
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CHICAGO, ILL.

WEATHERHEAD

- Welded steel in construction for greater strength.
- Bosses fully threaded to hold valves without solder.
- All parts completely tin plated.
- Made in two to ten valve units with two valve spacings.

THE WEATHERHEAD CO.
632-714 Franklin Avenue • Cleveland, Ohio

MANIFOLDS





A Complete Pocket Size Tool Kit —

The No. RF Bonney Socket Set meets every need of the Refrigeration Service Engineer for a complete set of tools of this character.

Containing 19 pieces packed in a sturdy, pocket-size metal case measuring only $7\frac{3}{4}'' \times 3\frac{3}{8}'' \times 1\frac{1}{8}''$, it includes 5 sockets of various sizes for packing gland nut adjustments; 5 sockets, each a different size, for valve stem adjustments; 1 socket for kero-test valve adjustments; 3 sockets with double-hexagon openings for standard size nuts and studs; 1 sliding "T" handle, 4" long, 1 extension $4\frac{1}{2}$ " long; 1 ratchet handle and two male adaptors.

Each piece has been designed especially for its particular job and like all Bonney Tools is fully guaranteed.

Price complete \$7.50

For complete information about this set and the complete line of Bonney Refrigeration Tools, send for Catalog No. 136. Just mail the coupon today!

**BONNEY
FORGE & TOOL WORKS**
Jordan St. ALLENTOWN, PA.

Mail this Coupon today

Gentlemen:

RSE-1136

Please send me a copy of Catalog No. 136 describing the No. RF Set and your full line of tools.

Name _____

Address _____

City & State _____



YEARS ago, the founders of Alco Valve Co., Inc., combined an idea with knowledge and experience, and produced an automatic liquid refrigerant control valve far superior to anything then in use.

From that day to this, Alco Valve Co., Inc., has been a pioneer in the development of accurate refrigerant control devices and has continued to combine practical ideas and technical skill with an ever increasing knowledge of refrigerants and their control. The result is that Alco Valves are favorably known wherever refrigerants are controlled.

The knowledge gained through the years is yours for the asking. Alco engineers are at your service. Let them show you how to obtain highest efficiency through the proper application of accurate control devices.

See the Alco Exhibit and talk to Alco Engineers at the R. S. E. S. Convention, Memphis, Tennessee, November 11, 12, 13, 1936; or write, wire or phone the factory or any representative at any time.

**ALCO
VALVE CO., INC.**
2628 Big Bend Blvd.
St. Louis, Mo.,
U. S. A.

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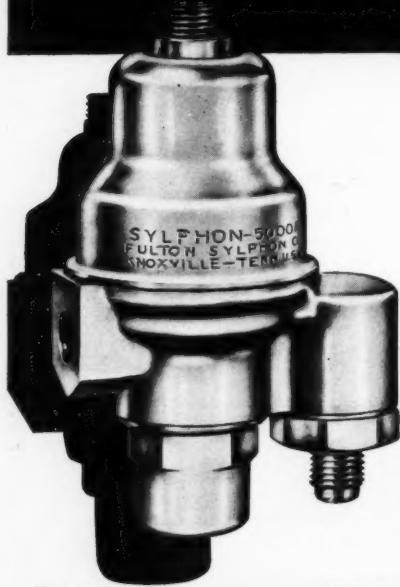


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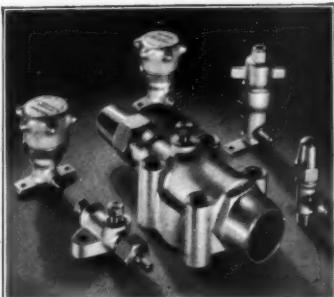
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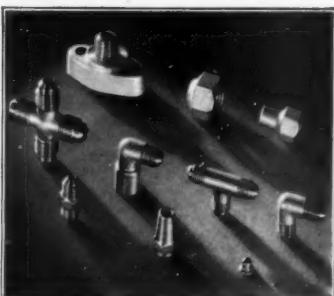
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